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INTRODUCTION

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Some of the larger FABs have been divided into sections to ilitate use. Abstracts are not printed in more than one section. larger FABs also have subject indexes provided.

Copies of all original articles referred to in the abstracts may bought (or occasionally borrowed) from the International Food ormation Service. A form for ordering these is provided at the of this FAB.

Coverage of the subject has been restricted to that of Food Science Technology Abstracts, which covers over 1200 of the important food rnals, patents from 20 countries and books published world-wide. ry effort is made to include all significant references, but torial discretion is used on the many articles of borderline interest. the reader particularly needs an exhaustive search of the subject, will be pleased to provide any other references that we have ilable. We would in any case encourage readers to write or ephone us with any comments or queries they may have.

J. NEWTON
ASSISTANT EDITOR

VOLUME 1

60
ect of nisin, moisture and salt on butyric acid
nentation in processed cheese.]
lkov, A. V.; Kostritskaya, N. P.;
lryashova, M. M.; Ramazanova, O. P.
ochnaya Promyshlennost' 29 (8) 34-37 (1968) [5
Ru] [Vsesoyuznyi Nauchno-issled. Inst.
lodel'noi i Syrodel'noi Promyshlennosti, USR]
ests with 4 strains of Clostridium
obutyricum, 2 of Cl. butyricum and 1 of Cl.
ium grown on calcium lactate medium showed that
tyrobutyricum (particularly a strain (G_1)
ated from Dutch cheese) was more resistant to
and low pH than the other 2 species, and
uired ⩾4.5% salt for inhibition vs. 2-3%.
ches of Kostromskii 40% fat processed cheese
e made with salt concn. in the total aqueous
se ranging in 5 steps from 2.72 to 6.4%, with 0,
or 150 RU nisin/g for each step. Spores of
in G_1 were added to the cheeses before
ting, at the rate of 600-1000/g and the finished
eses were stored at 16-18° or 8-10°C. With salt
cn. ⩽4.5% (2.3-2.4% in whole cheese at 50-52%
isture) 11% of cheeses showed butyric acid
mentation by organoleptic assessment. 100 RU
n had no effect, but with 150 RU the
idence of the fault was halved. At 8-10°C,
RU nisin protected the cheeses for 3 months
spective of salt concn. SKK

502
mbined effect of nisin and NaCl in processed
ese on clostridia causing butyric acid
wing.]
ay, G.; Krasz, A.
ipari Kutatasi Közlemenyek 11 (1) 3-10 (1968)
ref. Hu, en, ru] [Magyar Tejgazdasagi
erleti Intezet, Mosonmagyarovar, Hungary]
Unsalted Trappist cheese made from milk
culated with Clostridium tyrobutyricum was
cessed with 0-3.0% salt and 10-200 RU/g nisin.
processed cheeses were stored at 37°C for ⩽60
s and the rate of deterioration (blowing) was
ermined. Salt and nisin were found to have a
ergistic inhibitory effect on blowing. SKK

332
use of "non-therapeutic antibiotics" in heat
essed foods. [A review]
F.
hema-Monographien 63 (1125/1143) 313-36 (1969)
ref. En, de, fr]
se of the antibiotics nisin and subtilin in
ds, as a means of reducing the high temp.
ded for heat sterilization is reviewed. Both
tances are said to have no anti-microbial
t in humans. Uses of the compounds in dairy,
t, fish and canned fruit and vegetable
ducts, their chemistry and mode of action are
ussed. TW

7 P 604
[Effect of fat content and nisin on butyric acid fermentation in processed cheese.]
Gudkov, A. V.; Kudryashova, M. M.; Kostritskaya, N. P.; Ramazanova, O. P.
Molochnaya Promyshlennost' 30 (3) 21-23 (1969) [4 ref. Ru] [Vses. Nauchno-issled. Inst. Maslodel'noi i Syrodel'noi Promyshlennosti, Uglich, USSR]

Processed Kostromskii, 'Druzhba' and cream cheese were made with the following characteristics respectively: fat in DM, 36.8, 52.0 and 62.4%; moisture, 51.5, 50.1 and 49.5%; pH, 5.6, 6.0 and 6.2; salt concn. in aqueous phase, 4.2, 3.2 and 3.4%. Batches of each type of cheese containing 0, 100 or 150 RU nisin/g were prepared and spores of Clostridium tyrobutyricum G were added as previously described [FSTA (1969) 1 1P60.] In a 90-day storage expt. none of the Kostromskii cheeses showed butyric acid fermentation at 8-10°C, and at 16-18°C 150 RU nisin gave complete protection for 1 month. No 'Druzhba' cheeses showed fermentation for 2 months at 8-10°C, but at 16-18°C all those without nisin were blown within 1 month; nisin at 100 and 150 RU reduced blowing to 1/3. After 2 months at 16-18°C all 'Druzhba' cheeses were blown whether or not they contained nisin. Cream cheeses began blowing at 8-10°C within 1 month, nisin giving incomplete protection; at 16-18°C all were blown at 1 month. Subsequent expt. showed that 200 RU nisin/g prevent butyric acid fermentation in processed cream cheese. SKK

12 P 1258
Inactivation of nisin by alpha-chymotrypsin.
Jarvis, B.; Mahoney, R. R.
Journal of Dairy Science 52 (9) 1448-50 (1969) [14 ref. En] [Nat. Coll. of Food Technology, Weybridge, Surrey, England]

In reaction mixtures containing 500 U nisin (Nisaplin)/ml and various pancreatic enzymes, % inactivation of nisin at pH 6.8 and 37°C was as follows: 109 μg pancreatin/ml, 29.6% inactivation after 4 h; 115 μg pancreatin/ml, 81.9% after 18 h; 90 μg α-chymotrypsin/ml, 69.4% after 4 h; and 48 μg α-chymotrypsin/ml, 95.4% after 18 h. Nisin was not inactivated by crystalline trypsin, elastase or carboxylase, or by commercial preparations of pepsin or erepsin. Tests on samples obtained during fractionation of commercial pancreatin suggested that nisin inactivation is associated with α-chymotrypin and not with trypsin. Both chymotryptic and nisin-inactivating activities of commercial trypsin were inhibited when the enzyme was treated with diisopropylfluorophosphate. CDA

1 P 30
Manufacture and keeping quality of low fat dairy spread.
Goel, M. C.; Calbert, H. E.; Marth, E. H.
Journal of Milk and Food Technology 32 (8) 312-18 (1969) [14 ref. En] [Dept. of Food Sci., Univ., Madison, Wisconsin 53706, USA]
The use of stabilizers, effects of storage temp. and addition of nisin were studied in 6 lots of dairy spread containing 35-50% milk fat and 8-13% SNF. An increase in fat:SNF ratio caused an increase in wheying-off, a decrease in body strength and a deterioration in body, texture and appearance of the spread. A decrease in the ratio had the opposite effects unless reduced below 10:13 when detrimental effects on overall quality were indroduced. Of the 4 stabilizers tested, that composed of carboxymethyl cellulose, carrageenin and locust bean gum gave the best results. A storage temp. of 40°F instead of 45°F improved overall quality and shelf-life of the spread, with less wheying-off, and at the lower temp. the addition of 1465 ppm nisin yielded a product which showed no signs of bacterial spoilage after 6 wk. Ma

T 67
ecifications for the identity and purity of food ditives and their toxicological evaluation: some tibiotics. Twelfth Report of the Joint FAO/WHO pert Committee on Food Additives.
od and Agriculture Organization of the United ations
AO Nutrition Meetings Report Series 45 49pp. 969) [15 ref. En] [Rome, Italy]
The occurrence of antibiotics residues in food of imal origin is reviewed under the headings: Control measures"; "Residue levels likely to cur in foods"; "Nature of residues". The direct xic, indirect toxic, and microbiological fects of antibiotic residues in food are scussed. The uses, nature of residues, ological data, acceptable levels of residues, fects of residues and recommendations are given r streptomycin, dihydrostreptomycin, kanamycin, omycin, erythromycin, leucomycin, oleandomycin. iramycin, tylosin, penicillins, nystatin, maricin, bacitracin, nisin, polymyxin B, lortetracycline, oxytetracycline, tetracyline, loramphenicol and novobiocin. JN

C 57
Antibiotics in the food industry.] Antibiotiki v shchevoi promyshlennosti. [A book]
vcharova, T. P.; Maslennikova, N. M.
2pp. (1969) [121 ref. Ru] Moscow: Izdatel'stvo ishchevaya Promyshlennost" Price 0.27 Rouble
This booklet, intended for research workers and chnicians in the food preserving industry, ntains chapters on: 'Selective action of tibiotics on microflora of food products' (pp. 5-); 'Use of antibiotics in preservation of food oducts' (pp. 13-55, dealing mainly with nisin d its use in dairy products and the canning of green peas, tomatoes and potates); 'Use of antibiotics for increasing storage life of food products' (pp. 55-84, dealing primarily with dairy products, meat, poultry, fresh fish, vegetables, and berries); and 'Determination of antibiotics in food products' (pp. 88-93). SKK

3 S 245
Effect of nisin on the Lactobacilli that cause greening of cured meat products.
Stankiewicz-Berger, H.
Acta Microbiologica Polonica Series B: Microbiologica Applicata 18 (3/4) 117-20 (1969) [8 ref. En, pl] [Inst. Przemyslu Miesnego, Ul. Rakowiecka 36, Warsaw, Poland]
Nisin inhibited growth and affected thermal resistance of investigated Lactobacilli strains. The most sensitive was Lactobacillus viridescens No 13, the most resistant was Lactobacillus sp. No 20. Addition of nisin (200 RU/1 g) protected frankfurters against discoloration, but only in the case when infection occurred before the thermal process. AS

4 A 136
Specifications for identity and purity of some antibiotics.
Food and Agriculture Organization of the United Nations
FAO Nutrition Meetings Report Series 45A 107pp. (1969) [En] [Rome, Italy]
In this report, details are given of specifications for physical and chemical properties, identity and purity of streptomycin, dihydrostreptomycin, neomycin, erythromycin, olendomycin, spiramycin, tylosin, penicillins, nystatin, pimaricin, bacitracin, nisin, polymyxin B, tetracycline, chlortetracycline, oxytetracycline and novobiocin. Descriptions of approved methods for assay of the antibiotics in cheese, butter, ice cream, dried milk, whole milk, butter milk, evaporated milk, eggs, animal tissues and animal feeds are also included. SPT

5 P 616
The application of microbial enzymes which inactivate antibiotics: a review. [A review]
Jarvis, B.; Berridge, N. J.
Chemistry and Industry 1969 (48) 1721-24 (1969) [50 ref. En] [Nat. Coll. of Food Technology, Weybridge, Surrey, England]
The review covers the microbial enzymes which inactivate antibiotics, penicillinases in particular, the mechanism of enzymic inactivation and the applications of these enzymes in the lab., industry and the field of medicine. Uses cited are the application of penicillinase for the routine identification of penicillin in milk supplies, the possible use of nisinase for the identification of

n in cheese, the destruction of penicillin in
for cheesemaking by addition of penicillinase
the possiblity of using enzyme-inactivated
biotics as precursors for the synthesis of new
biotics. The paper was read at a meeting of
Microbiology Group of the Society of Chem.
, London, 26th Sept. 1968. BFMIRA

136
sin. I. Effect of proteases on nisin activity.]
r Nisin. I. Wirkung von Proteinasen auf die
ivität von Nisin.
mann, U.; Belitz, H.-D.
tschrift für Lebensmitteluntersuchung und -
schung 141 (5) 260-62 (1969) [13 ref. De, en]
t. für Lebensmittelchemie, Technische
chschule, Munich, W. Germany]
nisin preparation (3×10^7 Reading units/g)
ved highly resistant to attack by trypsin, α-
motrypsin, pepsin, papain, subtilisin A, and
ergillus oryzae and Asp. parasiticus
teases, as well as by α- and β-amylases.
ults of proteolysis indicated that only 1 of
9 lysyl bonds/molecule potentially open to
ck was split in 60 min at 37°C at an
yme:nisin ratio of 2:100 by any of the
teolytic enzymes tested; activity of the nisin
paration against Micrococcus flavus remained
mpaired after incubation with these proteases
⩽20 h. SKK

715
ors affecting survival of salmonella in
ddar and Colby cheese.
grove, R. E.; McDonough, F. E.;
tingly, W. A.
rnal of Milk and Food Technology 32 (12) 480-84
9) [10 ref. En] [Dairy Products Lab., Eastern
ization Res. and Development Div.,
hington, DC 20250, USA]
spp. of Salmonella were added to milk prior to
manufacture of 7 experimental Colby and 65
ddar cheeses. Salmonellae were capable of
ival in ripening cheeses for 2-9 months. The
and amount of acid produced during
semaking influenced survival, the greatest
ne in numbers being at pH 5.0. Using a 3%
er, an 80% reduction of the initial inoculum
red on the 1st day of storage compared to 0%
ction with a 0.5% starter. Addition of
ionibacterium shermanii and Leuconostoc
as starter organisms favoured the growth of
onellae. Streptococcus cremoris proved more
itory than Str. lactis. Variables such as
1.4-2.7%), and the chemical additives
tyl, potassium sorbate, nisin or sodium
te had little effect on survival and neither
he degree of pasteurization of the initial
. Factors contributing to subnormal acid
uction enhanced the growth and survival of
onellae in cheese. SAH

7 P 860
[Presence of nisin-producing streptococci in milk for Grana cheese manufacture and their influence on the milk's microflora.]
Carini, S.; Baldini, R.
Annali di Microbiologia ed Enzimologia 19 (2) 9-17 (1969) [6 ref. It, en] [Istituto di Ind. Agrarie, Univ. degli Studi, Milan, Italy]
The activity of nisin-producing bacteria both in milk and starters was evaluated. 80 000-160 000 nisin-producing streptococci were found in milk, whereas starters contained nisin-sensitive strains of Lactobacillus helveticus, L. jugurti, L. bulgaricus, L. lactis, L. fermenti, and L. acidophilus, the first 2 spp. being predominant and also very nisin-sensitive. Nisin-producing bacteria appear to inhibit starter lactobacilli during the initial stages of cheesemaking. Methods of analysis and sensitivity data of lactobacilli to nisin (cm of inhibition zone/RU nisin) are detailed. CEB

8 J 784
[Further data on the application of nisin in pea preservation.]
Kiss, I.; Kiss-Kutz, N.; Farkas, J.; Fabri, I.; Vas, K.
Elelmiszertudomany 2 (1/2) 51-57 (1968) [19 ref. Hu, en, ru] [Központi Elelmiszeripari Kutato Intezet, Herman Otto ut 15, Budapest II, Hungary]
To green peas (Lincoln variety) processed in 5/4 glass jars on a large scale by the conventional method, 600 mg/l. doses of nisin (as Nisaplin, Aplin & Barrett, Yeovil, UK) were added in the processing liquor which contained 4% sucrose, 2% NaCl, to attain a nisin concn. of 200 Reading unit/g in the final product. After heat treatment, the batches were cooled to 50°C (i) and to 37°C (ii), and stored for periods up to 5 months at 18-20° and at 30°C. Spoilage after 5 months at 18-20° was 2.0% at conventional levels of heat treatment ($F_0 = 7.4$) in the absence of nisin. At reduced levels of heat treatment ($F_0 = 0.9$) % spoilage rates with and without nisin respectively were 7.4 and 7.3 for (i) and 8.1 and 10.0 for (ii). Percentage flat sour spoilage with reduced heat treatment (10 min at 111-13°C instead of 20 min at 118°C) in (ii), with and without nisin respectively, was 2.0 and 15.7. When using nisin, it is preferable to cool heat-treated jars to 37°C. By reducing the heat-treatment period, autoclave copacities can be increased by at least 12%. IF

9 C 204
Some causes of antibiotics in food.
Anon.
British Food Journal 72 (836) 77-79 & 86 (1970) [En]
Antibiotics occur in food mainly as a result of therapeutic treatment for animals or supplementation of animal feeds. A limited amount arises from the environment of the food (added to ice or water for fish and poultry). Microbial resistance to antibiotics, or sensitivity in

mans resulting from prolonged ingestion of small
ounts of contaminated food can occur. Allowed
els of some antibiotics in the UK are: 0.2 ppm
ilk), 0.1 ppm meat), 0.5 ppm (eggs) for
eptomycin; 0.15 ppm (milk), 0.5 ppm (meat), 0.2
ilk), 0.1 ppm (meat), 0.5 ppm (eggs) for
m (eggs) for neomycin; 0-0.006 ppm (milk and
eat), 0-0.18 ppm (eggs) for benzyl penicillin;
to 33 000 units/kg body wt./day for nisin;
.15 mg/kg body wt./day for tetracyclines.
nsfer of resistance, trends in antibiotics for
mal uses, and recommendations including
hibition of feeds supplemented with
dically used antibiotics, are briefly
cussed. PEG

M 844
ffect of certain bactericidal substances on
phylococci in dough used for production of
caroni products.]
cha, A.
lynsko-Pekarensky Prumysl 16 (2) 37-
(1970) [Cs] [Vyzkumny Ustav Mlynsko-
karenskeho Prumyslu, Prague, Czechoslovakia]
Because of unsuitable equipment in the production
e for long macaroni, it was impossible to
event the growth of micro-organisms. Expt. were
de with sorbic acid, nisin and lactic acid added
ectly to the dough. Sorbic acid did not give
isfactory results; the application of lactic
id is promising but requires long-term expt. to
ove its worth. STI

J 1110
ygienic evaluation of food products canned with
in.]
goroditskaya, V. P.; Shillinger, Yu. L;
pova, I. N.
giena i Sanitariya 35 (5) 37-40 (1970) [Ru, en]
st. Pitaniya AMN SSR, Moscow, USSR]
Green peas, semi-processed potatoes, white
bage, and tomato juice were canned, 100 mg
in of UK or Soviet origin being added/kg
oduct. On analysis of the products 1-3 yr later,
idual nisin ranged from 10 to 100 mg/kg in the
nples treated with UK nisin; all the samples
ated with Soviet nisin (analysed only after 1
contained 100 mg/kg. The products had no
mful effect when fed to expt. mice. No official
triction has been imposed on the use of
in in the canning of these products. HBr

P 1426
operties of nisin-producing and nisin-resistant
rters.]
rlikanova, S. N.; Gudkov, A. V.;
ofimova, T. I.
lochnaya Promyshlennost' 31 (6) 6-11 (1970) [10
. Ru] [Vses. Nauchno-Issled. Inst.
Maslodel'noi i Syrodel'noi Promyshlennosti,
Uglich, USSR]
Expt. carried out during 1967-68 in the All-Union Inst. of Butter and Cheese Ind. in Uglich on prevention of butyric acid fermentation in Kostroma cheese are reported. A nisin-producing starter composed of equal proportions of 5 nisin-producing strains of Streptococcus lactis (24-h cultures in sterilized milk; incubation at 30°C) was prepared on pasteurized milk. For the nisin-resistant starter, a mixture of 2 Str. lactis strains, 1 strain of Str. cremoris and 1 strain of Str. diacetilactis grown in sterilized milk at 25°C was added at 10% to milk autoclaved at 1 atm. for 15 min. Conditions of manufacture common to expt. and control cheeses were: renneting temp., 32°C; scalding temp., 40-41°C; total pressing time, 150 min; ripening temp., 10-12°C; $CaCl_2$ addition, 20 g/100 kg milk; cheese dye addition, 15 g/100 kg milk; water addition to whey during heating, 13-15%; NaCl addition, 300 g/100 kg milk. 0.5% Uglich starter (containing St. diacetilactis, Str. diacetilactis var. acetoinicus and Str. paracitrovorus) was used for (i) control cheeses and 0.3% nisin-resistant + 0.15% nisin-producing starter was used for (ii) expt. cheeses. 60-100 clostridia spores/ml milk were added to some batches of milk for both types of cheese. [continued in following abstr.] SKK

10 P 1427
[Properties of nisin-producing and nisin-resistant starters.]
Karlikanova, S. N.; Gudkov, A. V.;
Trofimova, T, I.
Molochnaya Promyshlennost' 31 (6) 6-11 (1970) [10 ref. Ru]
[Continued from preceding abstr.] Detailed information is presented on ripening, acidity, composition, micro-flora, and organoleptic and other characteristics of the cheeses. (ii) contained during the 1st 10 days ~830 RU nisin/g; the quantity decreased during ripening to ~330 RU in 75-day old cheeses. Growth of added butyric acid bacteria was largely suppressed in (ii) but remained at original level in (i). Organoleptically and on appearance, (ii) made from milk with added clostridia were superior to corresponding (i); there was no difference between (i) and (ii) made without added clostridia. Use of expt. starters is recommended in spring and autumn. [See FSTA (1969) 1 7P604.] SKK

11 B 98
[Increasing nisin production of Streptococcus lactis by irradiation.]
Hylmar, B.; Teply, M.; Tesarkova, H.
Prumysl Potravin 21 (6) 186-90 (1970) [21 ref. Cs, ru, en, de] [Vyzkumny Ustav Mlekarensky, Prague, Czechoslovakia]
Nisin-producing strains of Streptococcus lactis (Lactoflora strains 64, 68 and 71 were irradiated 1-4 × with 420.3 W/cm² UV light from a mercury vapour lamp or 1-4 × with 30 000 rad γ-radiation from a Co source, or combinations of both (a

l of up to 4 irradiations). Values for nisin acid production in 5 subcultures of each in by mutants isolated after irradiation are ılated. Irradiation generally increased nisin duction and lowered acid production by in 64 and to a lesser extent by strain 71 but little effect on these 2 characteristics in in 68. Effects of growth in neutralized ia on nisin and acid production by the 3 ins are also tabulated. SKK

1904
uence of the salt, moisture and nisin-ducing starter contents on butyric ıentation in cheese.
ikanova, S. M.; Gudkov, A. V.
rnational Dairy Congress (18th, Sydney) 1E: (1970) [1 ref. En] [All-Union Sci. Res. of the Butter and Cheese Ind., Moscow, USSR] lthough brining for 4 days prevented butyric ıentation, it resulted in salty, hard, and n bland and bitter flavoured cheeses. Cheeses e with nisin-producing starters did not develop ric fermentation and were of top quality. CDA

VOLUME 3

104
nical preservatives in foods in Australia.
ardson, K. C.
l Preservation Quarterly 30 (1) 2-8 (1970) [17 En] [Div. of Food Preservation, CSIRO, Ryde, South Wales, Australia]
e author briefly explains the principles lved in current food additives legislation in ralia. Although different States have their legislation. All States have recently ed to accept recommendations concerning the f food additives including preservatives. tances defined as preservatives are listed, a table shows their permitted use in ralia. The position of substances excluded the definition - salt, nitrite, and acetic - is discussed. The mode of action and erties of the major permitted preservatives, ur dioxide, benzoic acid, sorbic acid and ionic acid and their salts, nisin and diethyl carbonate (recommended for future use) are discussed. BFMIRA

70
eedings of a conference on cheese ology.] Syrotech-70 (Zbornik). [Conference edings]
pp, I. (Editor)
, (1970) [Sk & Cs]

[Continued from preceding abstr.] Packaging materials for cheese, by M. Benko (pp. 170-83) [see FSTA (1971) 3 4P676]; Progress in the technology of ewes' milk cheese, by I. Prekopp (184-204); Manufacture of cheese from ewes' milk in Bulgaria, by P. Cernev [Chernev] (192-204) [see FSTA (1971) 3 4P677]; Present situation and prospects in the manufacture and use of rennet, by M. Teply (205-20, 18 ref.); Effect of different forms of Ca and inorganic P on milk rennetability, by S. Gajdusek and F. Sebela (221-28, 13 ref.); Assessment of the suitability of milk for cheese manufacture, by Z. Kreal (229-42); Possibilities of utilizing whey, by M. Dluzewski and E. Pijanowski (243-55, 18 ref.); [see FSTA (1971) 3 4P678]; Some results of studies of milk processing and utilization of by-products, by S. Poznanski (256-304, 54 ref.) [see FSTA (19-1) 3 4P679]; Increasing resistance of Lactobacillus casei to nisin, by B. Hylmar (305-08) [see FSTA (1971) 3 4P680]; and Detection of antibiotics in milk, by J. Jankov and S. Obretenova (309-14) [see FSTA (1971) 3 4P681.]

4 P 680
[Increasing resistance of Lactobacillus casei to nisin.] (In 'Proceedings of a conference on cheese technology'.) Syrotech-70 (Zbornik).
Hylmar, B.
pp 305-08 (1970) [Cs] Zilina, Czechoslovakia: Zavodna Pobocka CSVTS pri Vyskumnom Pracovisku Mliekarenskeho Priemyslu v Ziline [Vyzkumny Ustav Mlekarensky, Prague, Czechoslovakia]
Lactobacillus casei D, which is widely used in Czechoslovakia, was grown in a milk medium enriched with molasses, malt sprouts, yeast extract and ammonium phosphate to which 50 IU nisin were added/ml. Adaptation to this quantity of nisin was obtained after culturing for 6 days in each of 10 passages. Further progressive adaptation to 100, 150 and 200 IU nisin/ml was obtained by culturing at 30°C in whole milk alone, with 10 five-day passages at each nisin concn. The acidifying activity of the adapted strain was less than that of the original strain, but its proteolytic activity was equal to or higher than that of the original strain. The adapted strain could therefore be used in the manufacture of Edam-type cheese, nisin being added to inhibit the growth of butyric acid clostridia. SKK

5 T 220
Toxicological evaluation of some combinations of food preservatives.
Shtenberg, A. J.; Ignat'ev, 8. D.
Food and Cosmetics Toxicology 8 (4) 369-80 (1970) [15 ref. En, fr, de] [Inst. of Nutr., Acad. of Med. Sci., Ustinski proesd 2/14, Moscow G-240,USSR]
Short- and long-term studies are reported in which preservatives were administered orally, singly or in pairs, to rats and mice. Daily doses (in mg/kg) of (i) nisin (2 or 4), (ii sorbic acid (40 or 80), (iii) benzoic acid (40 or 80), and

sodium bisulphite (80 or 160) and mixtures of
(iv) (40/80 or 80/160 and ii)/(i) (40/2 or)
4) were given to mice or rats for 3, 17 or 18
nths and in a further test (i) 0.4-400
kg/day, (ii) 40 mg/kg/day and a polymeric
urity derived from (ii) were tested in mice
2 months. In addition to the effects of these
stances on growth and survival, haematology and
od chemistry (in rats), kidney function (in
) and reproduction (in mice), the effects of
ain stress factors, including dietary
riction, low temp. and carbon tetrachloride
inistration, on the potential toxicity of the
servatives were studied in both species. These
es showed some adverse effects in both rats and
e particularly on growth, survival and
eptibilty to stress, but (ii) appear
t toxic. Effects of the (iii)/(iv) mixture
e generally greater than those of the compounds
n singly, while the reverse was the case with
(i) mixture (i) increased the growth rate
n given alone. The authors' recommendation that
use of benzoate and sulphite as preservatives
uld be further restricted and that (ii)
uld be used instead where possible is being
owed in the USSSR. AS

1211
sible use of nisin and tylosin in conjunction
radiation inactivation of Clostridium
eurianum in tomato juice.]
etta, A.; Campanini, M.; Casolari, A.;
lilotti, F.
ustria Conserve 45 (4) 298-300 (1970) [23 ref.
, en, de] [Sta. Sperimentale per l'Ind.
Conserve Alimentari, Parma, Italy]
etermination of sensitivity of spores of Cl.
eurianum to irradiation (^{60}Co source of 20 000
giving an intensity of 2.96 Mrad/h) to nisin
to tylosin and of sensitivity of the
biotics to irradiation, are reported. The
lts suggest that combination treatments,
r nisin-γ-radaition or tylosin-γ-radiation,
d advantageously be used in the
urization" of tomato juice to prolong shelf
ECA

75
ent food additives legislation - Belgium.
& Agriculture Organization
ent Food Additives Legislation 1970 (136) 6
) [En] [Rome, Italy]
nisterial Decisions of 27 and 28 March, 1969
orizing the use of additives in foodstuffs.
ds the list of permitted addtiives as follows:
xidants - use of L-ascorbic acid at 50
g is extended to wheat flour; preservatives
authorized are: nisin (max. 2.5 mg/kg in
e), 250 mg/kg of one or more of SO_2, ben
and sorbic acid in mustard, max 1.2% benz
and salts in brine for diluting rennet-pepsin
ure for cheese curdling, max. 0.1% sorbic acid
alts in gingerbread and max. 70 mg/kg
expressed as SO_2 in rolled dough biscuits;
emulsifiers - permits max. 1.5% of mono and
diglycerides to be added to food pastes
subjected to heat treatment in containers;
thicseners - use of 10 kinds of thickeners is
extended to biscuits, zwieback, pastry products,
gingerbread; and surface coating substances and
glazes (beeswax may be used on gingerbread). VJG

8 U 580
Chemical preservatives in foods in Australia.
Richardson, K. C.
Fruit World & Market Grower 72 (1) 26-32 (1971)
[17 ref. En] [Div. of Food Preservation, CSIRO.,
Ryde, NSW, Australia]
Australian regulations on food additives are
reviewed. Chemical preservatives permtited in
Australian foods include: SO_2 and sulphites,
benzoic acid, sorbic and propionic acid and their
salts, nisin, diethyl pyrocarbonate, and
traditional food ingredients specifically excluded
from legal definition of preservative, salt,
nitrate, nitrite and acetic acid (or vinegar).
These are discussed with respect to their range of
use and mode of action. Applications of principal
permitted preservatives are tabulated. RM

9 P 1571
[Increasing the resistance of pure cultures of
lactobacilli to nisin.]
Hylmar, B.; Teply, M.; Tesarkova, H.
Prumysl Potravin 21 (12) 390-93 (1970) [19 ref.
Cs, de, ru, en] [Vyzkumny Ustav Mlekarensky,
Prague, Czechoslovakia]
By gradual adaption of Lactobacillus casei to
increasing amounts of nisin in a culture medium
consisting initially of full-cream milk enriched
with 5% of molasses base, 200-300 units of
nisin/ml had ultimately shown no inhibitory
effect. Adequate fermentation and proteolytic
activity of this nisin resistant Lactobacillus
strain was retained in the presence of 200
units of nisin/ml and is recommended for
fermentation and proteolysis in the manufacture of
Edam cheese when nisin is incorporated for the
inhibition of butyric acid producing clostridia.
The original Lactobacillus culture was shown to be
completely inhibited by 50 units of nisin/ml of
milk. OA

10 M 1194
[Method of cultivating bakers yeast.]
Rozmanova, N. V.; Kobrina, Yu. P. (Union of Soviet
Socialist Republics, Leningradskii Mezhotraslevoi
Nauchno-issledovatel'skii Institut Pishchevoi
Promyshlennosti)
USSR Patent 295 794 (1971) [Ru]
Spores are suppressed and antimicrobial activity
increased by adding nisin and biomycin to the
culture medium. The nisin and biomycin are added
during the 2nd h of cultivation at a ratio of 1:5,
based on 5-6 mgk [μg?] ml culture liquid. W&Co

11 P 1998
[Efficacy of 'nisin' starters in commercial manufacture of Gouda cheese.]
Lipinska, E.; Domanska, M.; Soltys, W.
Przeglad Mleczarski 20 (4) 18-19 (1971) [Pl] [Inst. Przemyslu Mleczarskiego, Warsaw, Poland]
This is a summary version (the full version may be obtained from the authors) of results of commercial scale tests of efficacy of starters, composed of nisin-producing and of nisin-resistant lactic streptococci and developed at the Dairy Industry Institute in Warsaw, in preventing butyric acid fermentation in cheeses. (i) 98 Gouda-type cheeses were made in a cheese factory between April and June 1967 and between Dec. 1967 and May 1968 using the 'nisin' starter and (ii) 98 cheeses were made in parallel using the customary commercial starter. Gradings of (i) and (ii) cheeses were: 1st grade, 23 and 11; 2nd grade, 57 and 55; 3rd grade, 14 and 22; processing grade, 4 and 10. For 10 and 13 (i) and (ii) cheeses respectively made from milk heavily contaminated with coliforms and containing anaerobic sporeformers, numbers in the different grades were: 4 and 1; 6 and 7; 0 and 4; and 0 and 1. Of 5 (i) cheeses made without saltpetre, 1 cheese was scored as 1st grade and 4 as processing grade vs. 4 (ii) cheeses scored as 2nd grade and 1 as processing grade. No nisin-inhibiting substances were detected in milk from collecting centres supplying the dairy and returning whey to the producers. SKK

12 P 2108
The growing use of nisin in the dairy industry.
Fowler, G. G.; McCann, B.
Australian Journal of Dairy Technology 26 (2) 44-6 (1971) [En] [Aplin & Barrett Ltd., Trowbridge, Wiltshire, UK]
The present situation of nisin in the dairy industry is briefly reviewed with particular reference to the international acceptance of nisin and to its use in processed cheese, chocolate milk, sterilized milk, canned milk pudding and recombined and reconstituted evaporated milk. Examples are given of nisin retention in various foods. CDA

VOLUME 4

B 7
Effect of monovalent [Na] and divalent [Cu, Fe, Mn, Mg, Ca] ions upon the germination of Bacillus spores in the presence of nisin.
Gupta, K. G.; Sidhu, R.; Yadav, N. K.
Journal of Food Science 36 (6) 896-898 (1971) [17 ref. En] [Dept. of Microbiol., Panjab Univ., Chandigarh-14, India]

2 P 140
The growing use of nisin in the dairy industry.
Fowler, G. G.; McCann, B.
Food Technology in New Zealand 6 (6) 25 & 27 (1971) [En]
In this discussion on the advantages and limitations of nisin, the international status of the preservative from a legislative point of view is considered, as is the importance of residual nisin. BFMIRA

3 M 376
[Reduced bacterial contamination in bakers' yeasts production.]
Kozlova, M. A.; Kobrina, Yu. P.
Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya 1971 (2) 82-85 (1971) [12 ref. Ru] [Leningradskii Mezhotraslevoi Nauchno-issled. Inst. Pishchevoi Promyshlennosti, USSR]
The antibacterial activity of a range of chemical substances was studied in bakers' yeasts production. The highest antibacterial effect was found with 0.02% furazolidone. Reduction of spore-forming bacteria in the culture amounted to 58% and of lactic acid bacteria to 62%. Addition of furazolidone to the fermentation medium increased the yield and improved the quality of the yeasts. Neomycin and polymyxin (10 units/ml) reduced the count of spore-forming and lactic acid bacteria. Nisin was particularly effective against lactobacilli. The antibiotics improved the yield and baking quality of yeasts. Of the alkaline detergents which did not reduce the yield of yeast the best have proved to be trisodium phosphate and sodium hexametaphosphate (0.1%). GIPCH-200 a highly effective antimicrobial paste, dosed in 0.01% amounts, impaired the quality of the yeast. STI

3 P 299
[Nisin-producing streptococci. II. The microflora of Grana cheese and Str. lactis bacteriophages.]
Carini, S.; Gregori, A. de; Sozzi, T.
Scienza e Tecnica Lattiero-Casearia 22 (3) 149-165 (1971) [15 ref. It, en] [Istituto di Industrie Agrarie, Univ., Milan, Italy]
Nisin-producing strains of Streptococcus lactis (annual average count, 100 000/ml) were found in milk used for production of "Parmesan-Reggiano grana" cheese, but were not present in the milk for "Padano grana" cheese. All Lactobacillus strains studied were inhibited by 5-50 RU nisin/ml; streptococci, other than St. bovis and Str. faecalis var. liquefaciens were inhibited by 1-100 RU nisin/ml; sensitivity of micrococci and propionibacteria varied from insensitive to inhibited by 1-5 RU/ml; dairy yeasts were not inhibited. A few strains amongst both nisin-producing and non-producing Str. lactis were found to be sensitive to several streptococcal bacteriophages, individual strains differing in phage psecificity. Only a few strains among the

dairy microflora were able to inactivate nisin, among them, Str. faecalis var. zymogenes, Str. faecalis var. liquefaciens, Str. diacetilactis and Escherichia coli, all of which caused 10-20% decrease in nisin activity. Results showed it to be useful to add either nisin or nisin-producing streptococci to the starter for Grana cheese, resulting in inhibition of clostridia and the avoidance of blowing of the cheese [See also FSTA (1970) 2 7P860.] ECA

6 P 914
The growing use of nisin in the dairy industry.
Fowler, G. G.; McCann, B.
Indian Food Packer **25** (1) 53-58 (1971) [6 ref. En] [Aplin & Barrett Ltd., Trowbridge, Wiltshire, UK]

After discussing the international acceptance of nisin as a food additive and defining the international unit of nisin, the article continues with a brief description of the uses of nisin in the production of processed cheese, chocolate milk and sterilized milk, canned milk puddings and recombined and reconstituted evaporated milk. Nisin can be used to control an existing spoilage problem, to allow a reduction in heat processing conditions, without creating spoilage problems, and in the formulation of new products where min. heat treatment is required. MEG

6 P 915
The in vivo effect of nisin on the microflora of the oral cavity.
Cowell, N. D.; Allen, A. R.; Jarvis, B.
Journal of Applied Bacteriology **34** (4) 787-791 (1971) [8 ref. En] [Nat. Coll. of Food Tech., Weybridge, Surrey, UK]

Saliva specimens, taken from 2 groups of 10 subjects who received 250 ml chocolate milk drink with or without 250 000 IU nisin/day for 14 days, were analysed for total viable and nisin-resistant bacteria. No significant differences were observed between pre- and post-test specimens from either group, when incubated aerobically on blood agar and anaerobically on blood and Rogosa agars. Since there was no evidence of development of nisin resistance, even among the lactobacilli, it is concluded that the residence time of nisin in the mouth is too short to permit development of resistance. CDA

3 P 1233
Comparison of nisin and hydrogen peroxide for he prevention of blowing and for the nutritive alue of cheese.]
Toma, C.; Moldovan, E.; Calinescu, S.; Mavromati, E.; Gontea, I.; Isvoranu, Z.
igiena **21** (1) 23-34 (1972) [53 ref. Ro, fr, de, n, ru] [Inst. de Cercetari Alimentare, Bucharest, Roumania]

17 Edam cheesemaking trials were carried out, ach comparing 200-l. batches of the same asteurized milk (i) infected with clostridial spores, r infected and treated with (ii) 40 RU nisin/ml and a nisin-resistant starter, or (iii) 0.8 ml 35% H_2O_2/l. for 10 min and then with catalase. The pH of cheese (ii) was initially higher than (i) and (iii). Its nisin content decreased from 175 RU/g 20 h after whey separation to 119 after 10 days and to 9 after 45 days. The spore counts were 10^3/ml in the milk and were 63 000, 39 000 and 9900 in cheeses (i)-(iii), respectively. Although the H_2O_2 treatment was effective, it reduced significantly the nutritive value of the cheese, the protein efficiencies being (i) 2.83, (ii) 3.01 and (iii) 2.71. Proteolysis was greatest in cheese (ii), with particularly high contents of tyrosine. JMD

8 P 1234
[Effect of sodium sorbate and nisin on keeping quality of Yantar' processed cheese.]
Rudavskaya, A. B.; Orlova, N. Ya.; Kutovoi, Kh. A.
Tovarovedenie **5**: 55-59 (1971) [Ru]

The storage life at -1°C to 5°C and 85-87% RH of soft processed cream cheeses of the Yantar' type is officially fixed at only 10 days because of high susceptibility of the cheeses to microbial spoilage. In tests to prolong the shelf-life, 0.06% sodium sorbate (as aqueous solution), 0.06% sorbic acid (as ethanolic solution), 100 or 200 IU nisin/g, or 0.06% sodium sorbate and 100 IU nisin/g were added to batches of Yantar' cheese 5 min before the end of processing. The cheeses and untreated controls were stored at 0-8°C and 89-98% RH or at 24-28°C and 78-80% RH. All cheeses were blown after storage for 10 days at the higher temp., but blowing occurred 3 days earlier and was more marked in control than in nisin-treated cheeses. After 10 days at the lower temp., 20% of the control cheeses and none of the treated cheeses were mouldy; at 1 month, % of mouldy cheeses among the treated ones were (in the order of addition listed above) 23, 21, 56, 60 and 18, and the incidence was 95% for the controls. Corresponding figures after 2 months were 88, 81, 100, 100 and 44%, and 100%. Sodium sorbate + nisin reduced microbial growth and inhibited acidity development and protein and fat breakdown to a greater extent than the other treatments; it also resulted in best retention of organoleptic quality by the stored cheese. Sorbic acid proved unsuitable for preservation of Yantar' cheese because of off-flavour formation. SKK

9 P 1301
[Attempted prevention of swelling in Edam-type cheeses using Nizpol preparation.]
Toma, C.; Moldovan, E.; Mavromati, E.; Calinescu, S.
Industria Alimentara **21** (7) 363-366 (1970) [6 ref. Ro, en, fr, de, ru] [Inst. de Cercetari si Proiectari Alimentare, Bucharest, Roumania]

Cheese milk, artificially contaminated by a suspension of 500-1000 spores/ml (Clostridium butyricum, Cl. tyrobutyricum and Cl. sporogenes)

nd treated with nisin (40 RU/ml) was made into Edam-type cheeses using nisin-resistant starters. Control milk was found to contain 45-250 spores/ml. After 45 days ripening, the nisin had been degraded and was found in only 4 out of 11 cheeses. At the same time, the spores germinated, resulting in the swelling defect in the cheeses. The content of essential amino acids was greater in the treated cheeses. It was concluded that the addition of nisin to cheese milk did not prevent the swelling defect in cheeses infected by butyric spores. SAC

1 C 285

nteractions of food starter culture and food-borne athogens: the antagonism between Streptococcus actis and sporeforming microbes. [A review]

Hurst, A.

lournal of Milk and Food Technology 35 (7) 418-123 (1972) [102 ref. En] [Res. Lab. of the Food nd Drug Directorate, Dept. of Nat. Health and Welfare, Ottawa, Ontario, Canada]

Lactic acid bacteria hinder development of sporeformers by production of acids, peroxides, and ntibiotics. One of the best known of these ntibiotics is nisin which is produced by Str. lactis nd is a permitted food additive in many countries. This review traces the history of nisin, its effect in nilk, cheese, processed cheese, and canned and ther foods. Nisin primarily affects Gram-positive acteria but some of these produce nisinase, an nzyme which inactivates it. The preservative effect f nisin in heat-treated foods is probably related to he retention of nisin on sporecoats. Nisin affects utgrowth of spores but not spore germination. AS

2 P 1921

nteractions of food starter cultures and food-borne athogens: lactic streptococci versus staphylococci nd salmonellae.

Gilliland, S. E.; Speck, M. L.

lournal of Milk and Food Technology 35 (5) 307-310 (1972) [9 ref. En] [Dept. of Food Sci., N. Carolina St. Univ., Raleigh, 27607, USA]

Factors which may contribute to the antagonistic ction of lactic streptococci towards salmonellae nd staphylococci in fermented milks are discussed. Factors in addition to the acidic environment reated by the streptococci must be involved since athogens are repressed even when milk is naintained at pH 6.6. Preliminary studies have hown that H_2O_2 accumulation may contribute owards the antagonism, particularly in the early tages of growth; antibiotics such as nisin, produced y certain lactic streptococci, may also be involved. CDP

12 U 797

Food Additives and Contaminants Committee report on the review of the Preservatives in Food Regulations 1962.

United Kingdom, Ministry of Agriculture, Fisheries & Food

89pp. SBN 11 240863 x (1972) [En] London, UK: H.M. Stationery Office Price 57p

A review of the Preservatives in Food Regulations (S.I. 1962 No. 1532) is presented. Subjects dealt with include: Antibiotics i.e. regulations concerning the use of tetracyclines, nisin, nystatin and pimaricin; Applications for preservatives not currently permitted, which should be rejected, these being, octyl gallate, formic acid, hexamethylenetetramine, nordihydroguaiaretic acid, metatartaric acid, mixture of fumaric acid and sodium benzoate; benzoyl peroxide and diethyl pyrocarbonate; The currently permitted preservatives and extended uses i.e. sorbic acid, SO_2, benzoic acid, para-hydroxybenzoates, propionic acid, diphenyl, copper carbonate, ortho-phenylphenol and its esters, and formaldehyde; CO_2 when used in packing food; Thiabendazole; Ethylene oxide; Nitrate and nitrite in food; and Preservative in beer. Also covered are: definitions of sauces, sausage and sausage meat, flavouring syrup and flavouring emulsion, sugars and glucose syrup, and flour confectionery; use of preservatives in canned tomatoes and canned fruit; preservatives content of glucose drinks; waxing of fresh fruit; and labelling of preservatives. Summaries of the committee's conclusions and recommendations are tabulated. The following 3 appendices are included: List of organisations who gave information or made representations; Specifications for preservatives in food; and Programme of research into nitrosamines, nitrates and nitrites. 2 annexes detail the Report of the pharmacology sub-committee and the Report of the antibiotics panel. AA

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16.	Taints in Foods	126	£2.00	☐	77	£2.00	☐	£4.00	☐
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See also back page

2 E 58
[Pasteurization of foods: a seminarium held on 10-11th March, 1971.]
Sweden, Svenska Institutet för Konserveringsforskning
SIK Rapport No. 292, 184pp. (1971) [Sv & En]

Papers given at the seminarium included: The microbiology of food pasteurization, by M. Ingram (pp. A1-A44, 57 ref.); Limitations of and factors affecting the botulinum cook, by P. J. Anema (pp. 1-16, 21 ref.); [Salt, nitrite and nitrate in combination with heat treatment of foods], by P. Zeuthen (pp. 17-33, 8 ref.); Nisin in combination with heat treatment of foods, by G. G. Fowler (pp. 34-41, 4 ref.); [Development trends in heat conservation in the light of research into spores at SIK], by B. G. Snygg (pp. 42-56); [The equipment manufacturer's viewpoint on problems of pasteurization], by S. Holm (pp. 57-77); [Dielectric pasteurization], by N. Bengtsson (pp. 78-93); [Irradiation pasteurization], by G. Härnulv (pp. 94-110, 28 ref.); [Choice of pack with pasteurization], by C. Sjöström (pp. 111-134); [Pasteurization of malt beverages and soft drinks], by B. Jacobsson (pp. 135-146); [Pasteurization of juice, fruit preserves and jam], by K.-J. Lindqvist (pp. 147-152); [Heat stabilization of foods in plastics packs], by O. Kvale (pp. 153-175); and [Pasteurization of meat products], by B. Eriksson (pp. 176-184). HBr

4 B 44
Effect of various sugars and their derivatives upon the germination of Bacillus spores in the presence of nisin.
Gupta, K. G.; Sidhu, R.; Yadav, N. K.
Journal of Food Science **37** (6) 971-972 (1972) [14 ref. En] [Dept. of Microbiol., Panjab Univ., Chandigarh-14, India]

5 P 646
The use of nisin in the food industry.
Fowler, G. G.; McCann, B.
Food Industries of South Africa **25** (6) 49, 51, 55 (1972) [6 ref. En] [Aplin & Barrett Ltd., Trowbridge, Wilts, UK]

The topic is briefly reviewed under the following headings: international acceptance of nisin; international unit for nisin; nisin in processed cheese production; use of nisin in chocolate milk and sterilized milk; canned milk puddings; recombined and reconstituted evaporated milk; and formulation of new products. VJG

9 T 474
[Use of nisin in manufacture of canned foods.]
Shornikova, N. M.; Ovcharova, T. P.; Maslennikova, N. M.; Ruben, T. M.; Borisova, M. S.
Konservnaya i Ovoshchesushil'naya Promyshlennost' No. 9, 15-16 (1972) [Ru] [Vses. Nauchno-issled. Inst. Konservnoi i Ovoshchesushil'noi Promyshlennosti, USSR]

The use of nisin in canned foods is permitted in the USSR, Great Britain, Austria, Poland, Italy, Hungary and Sweden. Nisin does not have wide-spectrum microbicidal activity, but reduces the heat resistance of thermophiles and eliminates the multiplication of butyric acid bacteria. The potential for reduction of sterilization time of canned foods was investigated in experiments with tomato pulp amd vegetable preparations for soup manufacture; no microbial spoilage was observed after 4 months storage, and the organoleptic properties were not impaired. A detailed description is given of the sterilization procedures for various vegetable products canned with nisin. STI

10 P 1544
Activation of nisin production by UV-irradition in a nisin-producing strain of Streptococcus lactis.
Kalra, M. S.; Kuila, R. K.; Ranganathan, B.
Experientia **29** (5) 624-625 (1973) [9 ref. En, de] [Nat. Dairy Res. Inst., Dairy Bacteriology Div., Karnal, India]

A survival curve was prepared of 6 h broth cultures of Str. lactis-6, washed and suspended in phosphate buffer (0.02M, pH 7), and exposed to UV irradiation of 0-10 800 ergs/mm^2. A dose of 9000 ergs/mm^2 gave <1% survival when subsequently plated on yeast/dextrose agar and high nisin-producing mutants were isolated. For determination of nisin production, isolates were grown in yeast dextrose broth for 16 h at 30°C and nisin was determined by the method of Tramer & Fowler [J. Sci. Fd. Agric. (1964) **15** (8) 522-528]. An increase in nisin production of 50 and 100% was evident after the 1st and 2nd UV irradiation treatments, after the 3rd treatment a downward trend was found, although the range in nisin production was greater than in the non-irradiated parent culture. The 1st and 2nd exposures to UV irradiation had no effect on acid production of the cultures, but the 3rd reduced it. Survival of Str. lactis was greater after the 3rd than after the 1st 2 exposures (5.2 vs. 0.17 and 0.26%). DMK

10 T 500
[Stability of nisin preparations.]
Tokmakova, V. N.
Trudy, Vsesoyuznyi Nauchno-issledovatel'skii Institut Konservnoi i Ovoshchesushil'noi Promyshlennosti **16**, 123-126 (1972) [8 ref. Ru]

Tests conducted to evaluate the storage stability of English (Nisaplin), Polish (Nizipol) and Soviet nisin preparations are described. Samples were stored in hermetically sealed and non-hermetically sealed packs, at 3-5°C and at 37°C; effects of pH and heating time and temp. on the thermal stability of the nisin preparations were also investigated. High temp. and storage in non-sealed packs adversely influenced the activity of nisin preparations, Nisaplin was the most stable of the preparations tested. STI

11 P 1676
Use of nisin in the dairy industry.
Kalra, M. S.; Dudani, A. T.
Indian Dairyman **25** (3) 111-113 (1973) [10 ref. En] [Nat. Dairy Res. Inst., Karnal]

Processed cheese containing 100 RU nisin/g (added with the emulsifier during processing) had a shelf life of up to 90 days at 30°C vs. <30 days for processed cheese not containing nisin. Similarly, incorporation of 100 RU nisin/g into khoa increased the shelf life by 1 month at 10°C, 3 wk at 22°C and 2 wk at 30°C. CDP

11 P 1677
[Study of nisin estimation methods.]
Jakubczyk, E.; Lipinska, E.; Kosikowski, M.
Roczniki Instytutu Przemyslu Mleczarskiego **15** (1) 27-38 (1973) [13 ref. Pl, ru, en] [Inst. Przemyslu Mleczarskiego, Warsaw, Poland]

In the course of studies on nisin manufacture and application in the dairy industry, (i) the Friedman & Epstein resazurin method for nisin determination [J. gen. Microbiol. (1951) Suppl. 830-839] using Streptococcus cremoris IP5 was compared with (ii) the diffusion method of Tramer & Fowler [J. Sci. Fd. Agric. (1964) 15 (8) 522-528] using Micrococcus flavus NBIC 8166. Standard errors of detrmination calculated from 20 series of (i) assays each in 5 replications were 15%, and from 10 series of (ii) assays, also in 5 replications, were 7.5%. Reduction of the error to ≤5% would require 47 and 12 replications of (i) and (ii) respectively. (ii) was approx. 50% more laborious than (i) but, for achieving a 5% error, (i) would be approx. 42% more laborious than (ii). SKK

11 R 549
[Effect of nisin (English) on microflora of sturgeon fish caviar.]
Ushakova, R. F.
Trudy Vsesoyuznogo Nauchno-issledovatel'skogo Instituta Morskogo Rybnogo Khozyaistva i Okeanografii **88**, 24-33 (1972) [9 ref. Ru, en] [Kaspiiskii Nauchno-issled. Inst. Rybnogo Khozyaistva, USSR]

Experiments were carried out on effect of salting at 5% without nisin or with addition of 0.1, 0.3 or 0.5% nisin (Applin & Barrett Ltd., Yeovil, UK) on keeping quality of pasteurized (60-225 min at 60°C) grainy caviar stored for ≤12 months in 2-oz sealed glass jars at from -2° to -4°C. Total counts and counts of proteolytic and H_2S-forming bacteria and of yeasts are tabulated. It is concluded that best results were obtained with a 0.05% nisin addition and pasteurization for 120 min, samples with nisin remaining in good condition for 1 yr, whereas those with salt alone deteriorated. Nisin content diminished with increase in pasteurization time and length of storage. Max. numbers of microorganisms were found in all samples in the 4th month of storage; microorganisms had largely disappeared by the 9th month and no growth was observed at 1 yr. SKK

12 P 1740
[Use of nisin in the manufacture of evaporated milk.]
Radaeva, I. A.; Efimova, V. A.
Trudy, Vsesoyuznyi Nauchno-Issledovatel'skii Institut Molochnoi Promyshlennosti **32**, 49-52 (1973) [2 ref. Ru]

The use of nisin was studied in the manufacture of evaporated milk in tubes at 3 Soviet dairy plants. Addition of 100 RU/g ensured the sterility of the product when the final heat treatment was carried out at 115°C with 10 min holding or at 112°C with 20 min holding. Compared with the controls sterilized at 117-118°C with 17-20 min holding, the products with nisin had lower acidity and viscosity, somewhat higher contents of P, Na and whey proteins and showed better retention of vitamin A, thiamin, riboflavin and ascorbic acid. The sterilization efficiency was not affected by the TS content (26 or 31-32%) of the milk. FL

12 P 1784
[Effect of nisin on microorganisms causing spoilage of evaporated milk.]
Efimova, V. A.; Radaeva, I. A.; Anatskaya, A. G.
Trudy, Vsesoyuznyi Nauchno-Issledovatel'skii Institut Molochnoi Promyshlennosti **32**, 46-49 (1973) [2 ref. Ru]

480 strains of sporeforming bactera isolated from 252 samples of defective evaporated milk (blown tins, curdled milk) comprised mainly Bacillus subtilus, B. mesentericus, B. mycoides, Clostridium sporogenes, B. cereus, Cl. butyricum (about 60-90% of the total number of isolates), but also B. megaterium, B. coagulans, B. macerans, B. novus and occasionally B. brevis and B. circulans. 15 of these strains and 8 strains obtained from a Soviet culture collection were examined for their sensitivity to nisin, using spores (>1 million/ml) in a hydrolysed skim-milk medium; and nisin concn. of 80-200 RU/ml. At 100-200 RU/ml, nisin decreased the heat resistance of the spores. In further experiments, heat-treatment of the medium at 113°C for 10 min or at 120°C for 5 min in the presence of 120-200 RU nisin/ml was effective for the inactivation of the spores. Spores of B. megaterium, B. cereus, B. mesentericus and B. circulans were the most sensitive. FL

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1

[Comparison of inhibitor tests.] Vergleichende Versuche und Gedanken zur Durchführung von Hemmstofftesten.
Kundrat, W.
Fleischwirtschaft **53** (8) 1121-1125 (1973) [18 ref. De, en, fr] [Bereich Hygiene und Tech. der Lebensmittel tierischen Ursprungs, Univ., 8000 Munich 22, Federal Republic of Germany]

Methods of determining antibiotics were compared using a number of media (e.g. DST agar, Mueller-Hinton /medium, seed agar, 45 min rapid test, 3 h test with 17 h pre-diffusion, rapid test with pre-incubation) and test organisms (e.g. Bacillus stearothermophilus var. calidolactis, B. subtilis strain BGA, B. subtilis ATCC 6633, B. stearothermophilus KU, B. stearothermophilus NCIB 8919, B. stearothermophilus var. calidolactis C 953). The 3 h test with B. stearothermophilus KU on KU medium at pH 7.0 was used as standard. RM

2

[Detection of antibiotics in milk.]
Cerna, M.
Prumysl Potravin **24** (10) 315-317 (1973) [42 ref. Cs] [Vyzkumny Ustav Mlekarensky, Prague, Czechoslovakia]

Biological methods for the detection of antibiotics are reviewed covering tests based on acid production and colour reduction, morphological changes of lactic acid bacteria, and growth of test organisms on liquid and solid media. FL

3

[Identification and detection of adulteration of nisin preparations with medicinal antibiotics.]
Lipinska, E.; Szadkowska, M.; Jakubczuk, E.
Roczniki Instytutu Przemyslu Mleczarskiego **13** (3) 15-27 (1971) [11 ref. Pl, ru, en] [Inst. Przemyslu Mleczarskiego, Warsaw, Poland]

A solution of the Polish nisin preparation Nizpol (1 million RU nisin/g) in 0.02N HCl containing 4000 RU/ml was adulterated by addition of 12.5, 25.0 or 50.0% of penicillin, streptomycin or erythromycin. The dilution procedure of Dopter [Lait (1957) 37 (361/362) 20-25] using a nisin-sensitive and a nisin-resistant strain of Streptococcus lactis, enabled identification of nisin, and demonstration of absence of other inhibiting substances or of adulteration with the antibiotics tested (in quantities of 2.5-5 IU penicillin, 25 µg streptomycin and <1 µg erythromycin), but did not allow identification of the adulterant. On the other hand, a bioautigraphic method using a Sarcina lutea strain sensitive to nisin and the other 3 antibodies enabled detection and identification (by differences in shape, size and location of inhibition zones) of 5 RU nisin, <1 IU penicillin, 2.5 µg streptomycin and <1 µg erythromycin in mixtures of these antibiotics, provided inhibition zones of the separate antibiotics were simultaneously compared. SKK

4

[Selection of Streptococcus lactis strains with enhanced nisin production.]
Jakubczyk, E.; Lipinska, E.; Szadkowska, M.; Lipniewska, D.
Roczniki Instytutu Przemyslu Mleczarskiego **15** (2) 97-106 (1973) [15 ref. Pl, ru, en] [Inst. Przemyslu Mleczarksiego, Warsaw, Poland]

2 nisin-producing Streptococcus lactis strains were exposed to UV and/or X-rays, and 54 strains with increased nisin-producing capacity were isolated. Most lost this increased capacity after subculturing, but 2 retained it after freeze-drying, storage for 6 months and subculturing 4 ×. They produced 1500-2000 units nisin/ml in milk and 8000-10 000 units/ml in neutralized medium. SKK

5

[Laboratory study of nisin concentration by microflotation.]
Lipinska, E.; Szadkowska, M.; Jakubczyk, E.; Lipniewska, D.
Roczniki Instytutu Przemyslu Mleczarskiego **15** (2) 25-35 (1973) [22 ref. Pl, ru, en] [Inst. Przemyslu Mleczarskiego, Warsaw, Poland]

3 laboratory microflotation devices consisting of (i) a single olumn with a foam-collecting collar, (ii) a variable-wet width column with a foam-collecting funnel, and (iii) a 2-stage device consisting of a container with an inlet for fresh fermented medium, and foam and spent-medium outlets linked in series to (iii), are described and diagrammatically illustrated. Whey obtained after renneting skim-milk which had been fermented for 18 h at 30°C with 3% nisin-producing Streptococcus lactis starter (with neutralization of lactic acid formed) was tested, 0.025% 'Emulphor 0' being added as emulsifier. Best nisin concn. were obtained by carrying out the foaming process for 1 h at 25°C and pH 4.5 with air flow speeds of 50, 200 and 400 l./h in (i)-(iii) respectively, 16-fold, 32-fold and 64-fold concentration of nisin being achieved. Levels of ≥100 000 U/ml in the 1st fractions were obtained with (iii). SKK

6

Use of nisin-producing lactic streptococci in cheese making.
Lipinska, E.
Annual Bulletin, International Dairy Federation No. 73, 37pp. (1973) [76 ref. En, Fr] [Dairy Res. Inst. Warsaw, Poland]

This report outlines the properties of nisin-producing (NP) and nisin-resistant (NR) cheese starters and describes the use of mixed NP + NR starters to prevent butyric swelling of cheeses. Methods for selecting suitable NR strains are discussed. MEG

7

Use of nisin for extending shelf life of processed cheese and khoa.
Kalra, M. S.; Laxminarayana, H.; Dudani, A. T.
Journal of Food Science and Technology, India **10** (3) 92-94 (1973) [13 ref. En] [Nat. Dairy Res. Inst., Karnal]

Addition of nisin (100 Reading units/g) to melted cheese extended the shelf-life of sterilized, tinned processed cheese at 30°C from 30 to 90 days by controlling growth of anaerobic spore formers in particular. Similarly, with canned khoa, shelf-life was increased by 1 month, 2 wk and 3 wk at 10, 20 and 30°C, respectively. Nisin failed to check yeast and mould growth in the cheese but was very effective in the khoa. SAB

8

[Determination of residual nisin in processed cheese.]
Hernandez Briz, S.
Anales de Bromatologia **24** (2) 217-230 (1972) [17 ref. Es, en] [Dept. de Investigacion, Gallina Blanca SA, Spain]

The British Standard method for estimation of nisin in processed cheese [BS 4020: 1966] was examined. Of bacterial strains used - Micrococcus lysodeikticus ACTT 4698, M. glutamicus and Sarcina lutea, the first was the most sensitive. Modifications suggested for extraction and assay procedure include vacuum filtration and washing of extract with ethyl ether. Inactivated extract is used for constructing standard curve. The inhibition halo of antibiotic-free cheese extract is reduced by washing with ethyl ether from 28.6-30.2 mm diam. to 20.7-24.3 mm. The base line for natural inhibition is thereby lowered sufficiently for determination of ≤1 unit of nisin/ml extract. Quantities of 20 units/ml extract can also be determined. The natural inhibitors appear to be lipid soluble or adsorbed on suspended particles. They increased with ageing of cheese. RM

9

[Substances with antimicrobial effect of importance in cheesemaking.]
Aarnes, G.
Meieriposten **63** (19) 415-422; (20) 450-456 (1974) [No]

This review-type paper, presented at the Agricultural College of Norway in Dec. 1973, discusses the mode of action and the application of substances used to counter butyric acid fermentation in cheese (nitrate, nisin, lysozyme, etc.) as well as substances preventing mould growth (sorbic acid, benzoic acid and related substances, and pimaricin). ADL

10

Methods for the estimation and differentiation of nisin in processed cheese.
United Kingdom, British Standards Institution
British Standard BS 4020:1974 (1974) [En] [2 Park Street, London W1A 2BS, UK]

This standard describes a method of estimation in which the nisin content of an HCl extract of processed cheese is assayed by a plate diffusion technique using Micrococcus flavus as test organism; the nisin potency of the sample is calculated by reference to standard nisin incorporated in specially prepared controls. Two methods of differentiating nisin from other antibiotics and antimicrobials are also described: in the 1st method, again using the plate diffusion technique with M. flavus, the stability of the inhibitory substance in the cheese extract is determined with regard to heating at pH 2.0 and pH 11.0 respectively; in the 2nd method, the ability of acid extracts of the cheese to produce zones of inhibition is determined using an assay plate with a nisin-producing strain of Streptococcus lactis as test organism. The presence or absence of nisin is inferred from the combined results of the 2 methods. Finally a method for confirming the identity of nisin in commercial preparations is given, based on assay after incubation with nisinase extracted from Bacillus cereus. ADL

11

Tetrazolium reduction method for assay of 'nisin'.
Kalra, M. S.; Dudani, A. T.; Laxminarayana, H.
Indian Journal of Dairy Science **26** (2) 137-138 (1973) [4 ref. En] [Nat. Dairy Res. Inst., Karnal]

A rapid method for assaying nisin produced in milk cultures by certain strains of streptococci involves addition of supernatant from a heat-killed 16-h skim-milk culture (30°C) of the nisin-producing strepto- coccus to a 16-h broth culture of Streptococcus faecalis DB 2112, and subsequent measurement of triphenyltetrazolium chloride (TTC) reduction by the Str. faecalis; the amount of nisin produced is estimated by reference to a standard curve relating TTC reduction to nisin concn. With 4 strains of Str. lactis which produced 700, 700, 500 and 250 RU nisin/ml as estimated by the cup assay method, corresponding values with the TTC method were 500, 600, 500 and 200 RU/ml. CDP

12

Isolation of nisin-producing streptococci by a plating technique using Micrococcus flavus.
Kalra, M. S.; Dudani, A. T.
Indian Journal of Dairy Science **26** (3) 208-209 (1973) [6 ref. En] [Nat. Dairy Res. Inst., Karnal]

Serial dilution of the test sample are plated on Nisin Assay agar (1% peptone, 0.3% beef extract,

0.15% yeast extract, 0.3% NaCl, 0.1% brown sugar and 1.5% agar, pH 7.5) seeded with a suspension of M. flavus. After incubation at 22°C for 24-48 h, nisin-producing colonies are surrounded by clear zones. Using this technique, 14 nisin-producing streptococci were isolated from 120 cows' milk samples, 35 from 50 buffaloes' milk, 1 from 20 goats' milk, and 9 from 50 market dahi samples. Nisin production by these isolates ranged from 125 to 1500 RU/ml in skim-milk and from 125 to 1000 RU/ml in yeast dextrose broth after 16 h at 30°C. CDP

13

[Inhibition of Staphylococcus aureus by nisin.]
Jarchovska, H.; Kolar, J.; Katzer, B.; Prikryl, F.
Prumysl Potravin 25 (6) 190-191 (1974) [11 ref. Cs] [Statni Vet. Ustav, Hradec Kralove, Czechoslovakia]

100-ml samples of sweetened condensed milk containing 0, 100 or 300 IU nisin/ml were inoculated with 0.01, 0.1 or 1 ml of an 18-h meat peptone broth culture (10^5-10^7 microorganisms/ml) of a strain of Staph. aureus isolated from clinical material or 1 of 2 strains isolated from condensed milk products; Staph. aureus counts were determined after incubation for 24 h at 37°C and after storage for 7 days at room temp. It is concluded from tabulated results, and from measurement of min. inhibitory concn. of nisin for the 3 strains, that ≥500 IU nisin/g would be required to inhibit growth of Staph. aureus in sweetened condensed milk. SKK

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Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be please to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

ASSISTANT EDITOR

1

Effect of butterfat on inhibition of Staphylococcus aureus by nisin.
Jones, L. W.
Canadian Journal of Microbiology **20** (9) 1257-1260 (1974) [10 ref. En, fr] [Dept. of Biology, Utah St. Univ., Logan, Utah 84322, USA]

2

Non-acid milk - the reappearance of an old problem.
Pearce, L. E.; Sage, N. F.; Hastings, J.
New Zealand Journal of Dairy Science and Technology **8** (4) 165-166 (1973) [2 ref. En] [New Zealand Dairy Res. Inst., Palmerston North, New Zealand]

Cheesemaking failure at 2 factories due to excessive counts of nisin-producing streptococci in the cheese milk was traced in each case to a refrigeration unit breakdown on one farm supplying the factory. The streptococci had multiplied to such an extent that even mixing with a vol. of normal milk to give approx. 100-fold dilution still left an nisin concn. inhibitory to the cheese starter. The nisin-producing organism in both cases was a strain of Streptococcus lactis. CDP

3

[Prevention of butyric acid fermentation in cheese.]
Gudkov, A. V.; Dolidze, G. G.
Molochnaya Promyshlennost' No. 7, 13-16 (1974) [Ru] [Vses. Nauchno-issled. Inst. Maslodel'noi i Syrodel'noi Promyshlennosti, Uglich, USSR]

After discussing briefly prohibition of silage feeding, as well as bactofugation and peroxide/catalase treatment of milk, and technological measures for controlling butyric acid fermentation in cheese, the authors deal with the use of nisin-producing and other inhibitory starters. The use of starters containing nisin-producing Streptococcus lactis in a cheese plant reduced the proportion of rejected cheeses from about 58 to 5%; however, because of certain shortcomings of these starters (e.g. slowness, lactose-fermenting activity, laborious preparation), their use is advocated only during periods of heavy milk contamination with spores (April-May and Oct.-Nov.). On the other hand, 'antagonistic' starters, which contain Lactobacillus plantarum strains producing H_2O_2 in quantities inhibitory to butyric acid bacteria, may be used throughout the year. For controlling butyric acid fermentation in processed cheese it is recommended that nisin be added at a rate of 150 U/g, preferably together with emulsifying salts. FL

4

Effect of nisin in reducing the thermal resistance of aerobic spore formers in sterilized milk.
[Conference proceedings]
Wajid, H. R. A.; Kalra, M. S.
XIX International Dairy Congress **1E**, 545 (1974) [En] [Nat. Dairy Res. Inst., Karnal, India]

The shelf-life of sterilized milk inoculated with Bacillus subtilis 9144 or B. stearothermophilus 1-63 (100 spores/ml) and heat-treated at 109°C for 5 min was increased from 3-7 to 60 days in the presence of 100 RU nisin/ml. Reduction of D-value of the spores in the presence of nisin was enhanced by raising the temp. of heat treatment, and decreased by increasing the spore load. CDP

5

Studies on nisin-resistant strains of bacteria.
[Conference proceedings]
Lipinska, E.
XIX International Dairy Congress **1E**, 394-395 (1974) [4 ref. En] [Inst. of the Dairy Ind., Warsaw, Poland]

Nisin-resistant (P) strains of Streptococcus lactis $2a_3$ and Propionibacterium shermanii 1296 had lower cell DM contents and higher fermentative activities at some growth stages than had corresponding normal (K) strains. The P stain of Str. lactis produced more diacetyl (1.70 vs. 0.56 mg/l.), acetoin (5.8 vs. 5 mg/l.) and CO_2 (120 vs. 87 mg/l.) and was more proteolytic than the K strain. [see Lipinska, "Studies on nisin-resistant strains of Streptococcus lactis and Propionibacterium shermanii". (1974) 80pp. Instytut Przemyslu Mleczarskiego, Warsaw, Poland]. CDP

6

Influence of cell-free substrates from residual milk microflora on carbon dioxide formation by susceptible and nisin-resistant strains of Propionibacterium shermanii 1296. [Conference proceedings]
Jakubczyk, E.; Kosikowska, M.; Lipinska, E.
XIX International Dairy Congress **1E**, 395-396 (1974) [6 ref. En]

Culturing K and P strains of P shermanii [see preceding abstr.] in cell-free substrates from milk cultures of various microorganisms, and measurement of CO_2 produced, indicated that the inhibitory effect of these substrates on P. shermanii increased in the order Micrococcus<Escherichia coli< Aerobacter aerogenes <Clostridium tyrobutyricum. In all cases the P strain was the more susceptible. CDP

7

Influence of cell-free substrates from starters upon carbon dioxide formation by susceptible and nisin-resistant strains of Propionibacterium shermanii 1296. [Conference proceedings]
Kosikowska, M.; Jakubczyk, E.; Lipinska, E.
XIX International Dairy Congress **1E**, 397-398 (1974) [8 ref. En] [Inst. of the Dairy Ind., Warsaw, Poland]

The K and P strains of P shermanii were grown

in cell-free substrates [see preceding abstr.] from separate milk cultures of K and P strains of starter bacteria. Lactobacillus helveticus K and L. bulgaricus P substrate had a strong stimulatory effect, Streptococcus thermophilus K and Str. faecalis P were strongly inhibitory, whilst P and K strains of L. casei had not effect on CO_2 production by P. shermanii; the P strain consistently produced less CO_2 than the K strain. CDP

8

Observations on the influence of L-alanine, phenylalanine and pyruvate on the germination of spores both in presence and absence of nisin. [Conference proceedings]
Gupta, K. G.
IV International Congress of Food Science and Technology **4b**, 50-51 (1974) [En] [Dept. of Microbiol., Punjab Univ., Chandigarh, India]

L-alanine has been shown to initiate spore germination, due to a deamination reaction leading to the formation of ammonia and pyruvate; oxidation of pyruvate or its products is essential for spore germination. Nisin inhibits spore germination. Experimental results showed that 0.01-0.2M L-alanine, phenylalanine and pyruvate increased the sporostatic effect of 100 units nisin/ml on spores of Bacillus stearothermophilus, B. cereus and B. megatherium, but this effect was reversed by 0.2M L-alanine added within 8 h of the contact between spores and nisin. Reversal was also obtained with phenylalanine and pyruvate. ELC

9

Study of manufacture of dried skimmilk with high content of nisin. [Conference proceedings]
Peterkova, L.; Hylmar, B.
XIX International Dairy Congress **1E**, 606-607 (1974) [En] [Dairy Res. Inst., Prague, Czechoslovakia]

Dried skim-milk, obtained in pilot-scale trials from milk cultured with nisin-producing strains of Streptococcus lactis (a mutant obtained by irradiation was best), contained 21 000 IU nisin/g and that obtained in commercial production 20 000 IU/g. The stability of nisin in dried milk was good, no significant reduction occurring during 6 months of storage. FL

10

[Study of the manufacture of dried milk with high nisin content.]
Peterkova, L.; Hylmar, B.
Prumysl Potravin **25** (12) 377-379 (1974) [13 ref. Cs] [Vyzkumny Ustav Mlekarensky, Prague, Czechoslovakia]

Large-scale production of nisin-rich milk, based on the results of laboratory and pilot-scale experiments, involved the cultivation of a nisin-producing culture of Streptococcus lactis 711 (at 2.5%) in 1880 l. concentrated skim-milk (18.97% TS) at 30°C for 6 h, neutralization, reduction of temp. to 23°C and continuation of the cultivation for about 30 h, with neutralization with 15% NaOH at 2-h intervals. The product was then spray-dried. It cont ained 20 000 IU nisin/g; lactose content was 20.9% and that of minerals 13.5%. The flora consisted solely of lactic acid bacteria; no coliform, aerobic or anaerobic spore-formers, enterococci, yeasts or moulds were present. On storage in paper/polyethylene laminate containers at 20°C nisin content decreased by about 14% after 7 months. FL

11

[Stimulation of nisin biosynthesis in whey media.]
Szadkowska, M.; Lipinska, E.; Jakubczyk, E.; Lipniewska, D.
Roczniki Instytutu Przemyslu Mleczarskiego **16** (1) 5-13 (1974) [17 ref. Pl, ru, en] [Inst. Przemyslu Mleczarskiego, Warsaw, Poland]

The value in nisin production of whey media supplemented with various substances considered capable of stimulating nisin biosynthesis was tested using the following nisin-producing strains of Streptococcus lactis: strain 91 isolated by Lipinska [Prace Instytutu Przemyslu Mleczarskiego (1955) **2** (2) 1-14]; strain F from the CNRA collection at Jouy-en-Josas (France); and strain 91/IV/C isolated by the authors after UV irradiation. It is concluded from tabulated results that using a whey medium with 2.5% potato syrup and 30% pepsin hydrolysate from a culture of group N streptococci in milk, yields of up to 4200 IU nisin/ml medium could be achieved, amounting to approx. 90% of the yield obtainable in skim-milk. The economic value of utilizing whey in nisin manufacture is discussed. SKK

12

[Comparative study of the effects of nisin and hydrogen peroxide on prevention of butyric fermentation of Edam cheese and on its nutritive value.]
Gontzea, I.; Toma, C.; Barduta, Z.; Moldovan, E.; Calinescu, S.; Mavromati, E.
Alimentaria **11** (57) 47-49, 51, 53-54, 57, 59, 61 (1974) [Es] [Centro de Investigaciones Sobre la Nutr., Inst. de Med. y Farmacia, Bucharest, Romania]

Milk pasteurized at 63°C for 30 min was inoculated with 500-1000 spores/ml of Clostridium butyricum, Cl. tyrobutyricum or Cl. sporogenes isolated from blown cheeses, then 200-l. portions were treated with (i) 40 RU nisin/ml, (ii) 0.8 g 35% H_2O_2/l. for 10 min, followed by catalase treatment, or (iii) no treatment. In 17 trials, the milks were made into Edam cheese using 0.7% starter composed of known nisin-resistant organisms with (i) and 0.4% normal commercial

starter with (ii) and (iii). The (i) cheese contained 175 RU nisin/g 20 h after whey separation. During the 1st 70 h, acidity development was slowest and pH remained highest in (i). Between days 10 and 45 of ripening, anaerobic spores counts doubled in (ii) cheeses, but increased 6-fold ($P < 0.05$) in (i) and 10-fold ($P < 0.001$) in (iii) cheeses. Treatment (ii) was the most effective in reducing blowing. Protein degradation was greatest in (i), which contained more free amino acids ($P < 0.001$) than the other cheeses after 45 days. Nutritional value of (i) for rats was 11.6% higher than that of (iii) and 13.6% higher ($P < 0.05$) than that of (ii) cheeses. CDP

13

Nisinogenic streptococci and their use in the making of Provolone cheese.
Senesi, E.; Emaldi, G. C.; Caserio, G.
Latte Feb., 84-86 (1975) [7 ref. It, en] [Istituto Sperimentale Lattiero-Caseario, Lodi, Milan, Italy]

30 streptococcal strains that could inhibit Micrococcus flavus were isolated from raw milk and were tested for acid production, heat resistance and nisin production; 2 nisin-producing strains were selected for use in making Provolone cheese. Provolone cheese made with whey starter and added clostridia and the nisin-producing streptococci showed slow acid development, poor yield and, in some cases, blowing. These faults were prevented by addition of nisin-resistant Lactobacillus helveticus to the whey starter. JMD

14

[Manufacture of bakery products (of standard quality and for diabetics).]
Bartlova, D.; Ticha, J.
Czechoslovak Patent 159 695 (1975) [Cs]

The formula for the products comprises, in addition to the usual ingredients, 200-750 units of nisin, added in the form of powder or aqueous solution, per g of the dry mixture for dough preparation. STI

15

[Use of nisin in in the manufacture of evaporated milk.]
Radaeva, I. R.; Anatskaya, A. A.; Efimova, V. A.
Molochnaya Promyshlennost' No. 2, 20-23 (1975) [4 ref. Ru] [Vses. Nauchno-issled. Inst. Molochnoi Promyshlennosti, Moscow, USSR]

16

[Study on obtaining Streptococcus lactis mutants with increased nisin production, by gamma irradiation.]
Hylmar, B.; Teply, M.; Pokorna, L.
Prumysl Potravin 26 (2, Mlekarske Listy 1 (1)) 86-89 (1975) [17 ref. Cs] [Vyzkumny Ustav Mlekarensky, Prague, Czechoslovakia]

All 10 nisin-producing strains of Streptococcus lactis obtained from the Lactoflora Collection were used in these studies, involving evaluation of > 3000 isolates. The most active isolate obtained after γ-irradiation produced a max. of 1700 IU nisin/ml vs. 470 IU/ml for the parent strain; this activity increased to 2200 IU/ml after storage in a freeze-dried culture. In milk, nisin production was about the same in static or submerged [stirred?] cultivation whilst a substantially higher nisin level (7800 IU/ml) was obtained in a whey medium with added $CaCO_3$, after 20 h of submerged [stirred?] cultivation. The nisin-producing capacity was found to be sufficiently stable, and it is considered that the mutants could be used in the production of dried nisin milk, or in a whey medium in the preparation of pure crystalline nisin. FL

17

[Use of nisin in processed cheese manufacture.]
Hylmar, B.
Prumysl Potravin 26 (4) 214-215 (1975) [Cs] [Vyzkumny Ustav Mlekarensky, Prague, Czechoslovakia]

Experiments carried out in Czechoslovakia on the use of nisin in the form of a dried concentrate in processed cheese manufacture are briefly described. The concentrate now produced commercially is made by incubation in skim-milk of a mutant of Streptococcus lactis with high nisin producing capacity for 24 h and drying. It is called Nislaktin and is added at 2% by wt. to the cheese together with emulsifying salts. Technological process remains the same, but the fact that the SNF content of the cheese is increased by 2% must be taken into account. FL

18

[Use of nisin in manufacture of evaporated milk.]
Efimova, V. A.
Nauchnye Trudy, Omskii Ordena Lenina Sel'skokhozyaistvennyi Institut imeni S. M. Kirova 121, 59-61, 132 (1974) [3 ref. Ru] [OOLSIiSMK, Omsk, USSR]

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H. BROOKES
ASSISTANT EDITOR

1

Production of nisin by Streptococcus lactis strains after freezing.

Oberman, H.; Kasperkiewicz, T.; Lysiak, B.

Acta Alimentaria Polonica 1 (1) 53-62 (1975) [11 ref. En, pl] [Inst. Tech. Fermentacji i Mikrobiologii Politechnika, Lodz, Poland]

Frozen concentrates of nisin-producing strains of Str. lactis were prepared from cells grown in modified Hurst medium, and in milk- and whey-based media, harvested at the beginning of the stationary phase of growth, and suspended in milk neutralized to pH 7 and supplemented with 1% sodium citrate. They retained satisfactory viability and acidification and nisin-producing properties for ≥42 days at -20° or -15°C, but did not recover any nisin-producing activity that had been lost before freezing. Survival was greater in concentrates containing $\leq 10^{11}$ bacteria/g than in those containing 10^{13}/g (52% vs. 16-39% after 21 days at -20°C). CDP

2

Biochemical characteristics of nisin-resistant strains of Propionibacterium Shermanii.

Pedziwilk, F.; Skupin, J.; Nowakowska, K.

Acta Alimentaria Polonica 1 (2) 131-136 (1975) [15 ref. En, pl] [Inst. of Food Sci., Acad. of Agric., Poznan, Poland]

4 nisin-resistant mutants of P. shermanii 1/17 produced more corrinoids than did the parent strain (5.96-6.6 vs. 5.25 µg/ml) when incubated in casein broth with 5,6-dimethylbenzimidazol as vitamin B_{12} precursor, but only 1 mutant showed a higher % of corrinoids as vitamin B_{12}; there were no significant differences in the amounts of acetic and propionic acids produced. In similar experiments using whey broth, the nisin-resistant mutants showed higher volatile fatty acid production than did the parent strain, which indicated a better utilization of lactose by the mutants; the mutants also produced more corrinoids than the parent strain on this medium. The greatest differences in amino acid composition of cellular biomass between the parent strain and 1 mutant respectively were (as % total amino acid content): lysine, 6.8 vs. 5.58; arginine, 5.26 vs. 6.87; asparagine, 9.93 vs. 11.82; glutamine, 18.19 vs. 15.3; and proline, 5.67 vs. 4.75. CDP

3

Stoppage in increase in acid production of yoghurt by incorporating a nisin-producing culture.

Kalra, M. S.; Dudani, A. T.

Indian Journal of Dairy Science 28 (1) 71-72 (1975) [5 ref. En] [Div. of Microbiol., Nat. Dairy Res. Inst., Karnal (Haryana), India]

Nisin-producing culture Streptococcus lactis-4 was inoculated into milk along with yoghurt culture and the final product was held at 22°C or 30°C. After 72 h at 22°C, the total acid production was 1.02% vs. 1.69% with yoghurt culture alone. At 30°C the acidity after 4 h was <1% against 1.40% in the control. This method of preventing increase in acid production in yoghurt does not affect the taste or the balance between the 2 components of yoghurt culture. LMB

4

Sensitive of some common starter organisms to nisin.

Kalra, M. S.; Dudani, A. T.

Indian Journal of Dairy Science 28 (3) 217-219 (1975) [8 ref. En] [Nat. Dairy Res. Inst., Karnal, India]

Nisin-whey prepared from a 24-h-old milk culture of Streptococcus lactis-4 was added to 6 lactic streptococci and 20 lactobacilli cultures which then held at 30°C for 8 h. Acid production by Str. diacetilactis DRC_1 and DRC_3 and Str. lactis C_{10} was inhibited >50% whereas Str. lactis HL and Str. cremoris C_{13} were not inhibited, Str. cremoris C_1 being intermediate. 5 strains of Lactobacillus spp. showed >30% inhibition, 6 showed no inhibition and 9 were intermediate. LMB

5

Influence of nisine on productivity of the nisine-producing strain Streptococcus lactis V-20.

Oberman, H.; Pabis, E.

Acta Alimentaria Polonica 1 (3/4) 221-234 (1975) [12 ref. En, pl] [Inst. Tech. Fermentacji i Mikrobiol., Politech., Lodz, Poland]

Initial concn. of 50-1000 RU nisin/ml in the culture medium (sterilized milk or 1/15M phosphate buffer) had little influence on the amount of nisin produced by Str. lactis V-20, although rate of nisin production was greatest when cells, isolated during or at the end of the log phase of growth, were inoculated into culture medium with an initial nisin level of ≤200 RU nisin/ml. In many cases, rate of nisin production was irregular, possibly due to unidentified physico-chemical factors or to utilization of nisin by the producing strain. Acidifying ability of Str. lactis appeared to be independent of nisin-producing activity, and was highest when the inoculum consisted of cells from the beginning of the log phase. When repeatedly inoculated into nisin-free milk, strains which had been grown in media containing 50-200 RU nisin/ml did not lose their nisin-producing activity as quickly as those which had been grown in media containing 500 or 1000 RU nisin/ml. CDP

6

[Effect of nisin on microorganisms causing spoilage of evaporated milk.]

Radaeva, I. A.; Efimova, V. A.; Anatskaya, A. G.

Molochnaya Promyshlennost' No. 1, 13-15 (1976) [3 ref. Ru] [Vses. Nauchno-issled. Inst. Molochnoi Promyshlennosti, Moscow, USSR]

Inhibitory effect of the Polish nisin preparation 'Nizpol' on the growth of spore-forming bacteria isolated from blown and coagulated specimens of evaporated milk was studied. Of the total of 480 strains isolated, 170 were spore-forming rods, Bacillus mesentericus, B. mycoides, B. subtilis,

Clostridium sporogenes, B. cereus and Cl. butyricum being most frequently identified but B. megaterium, B. coagulans, B. brevis, B. macerans, B. novus and B. circulans were also present. It is concluded from the results of laboratory experiments with these bacteria and trials at 2 milk preserving factories, that the addition of 100 RU nisin/ml in combination with sterilization at 115°C with 10 min holding ensures efficient sterilization of evaporated milk. The sterilization effect was not affected by TS levels in the 26-32% range. During storage at 20-25°C for 3-6 months no samples with defects of bacterial origin were found. FL

7

Effect of nisin-producing strains on the activity of some common starter cultures.
Kalra, M. S.; Dudani, A. T.
Indian Journal of Dairy Science **28** (4) 302-303 (1975) [8 ref. En] [Nat. Dairy Res. Inst., Karnal, India]

3 nisin-producing strains, (i) Streptococcus lactis-4, (ii) Str. lactis-6, and (iii) Str. lactis-496 were inoculated individually into skim-milk to which 1 of 9 starter cultures had been added and incubated for 8 h at 30°C. With (iii) only starter cultures Str. lactis C_{10} and Str. diacetilactis DRC_1 were inhibited; all other starter culture strains gave a favourable response. With (i) however, only 3 Str. lactis strains and with (ii) only 2 Str. lactis, 1 Str. cremoris and 1 Str. diacetilactis strain compared favourably with controls. LMB

8

[Nisin, the antibiotic produced ny Streptococcus lactis, and preservation of foods of animal origin.]
Yun, Y. H.; Kim, H. U.
Korean Journal of Animal Science **17** (5) 651-657 (1975) [32 ref. Ko, en] [Coll. of Agric., Seoul Nat. Univ., Suwon, S. Korea]

This review covers various aspects of nisin including biochemical properties, mechanism of biosynthesis, susceptible bacteria and application in preserving foods. Data are presented on effects of heat on nisin activity in skim-milk and processed cheese. [From En summ.] HLR

9

[Use of nisin in cheese manufacture.] Verwendung von Nisin bei der Käseherstellung. [Book]
Lipinska, E.; Gudkow, A. W.; Karlikanowa, S. N. 103pp. (1976) [many ref. De] Leipzig, German Democratic Republic; VEB Fachbuchverlag Price M5.80

This is a translation of a Russian book published by Izdatel'stvo Pishchevaya Promyshlennost' (Moscow) in 1972. It contains the results of joint research by the USSR All-Union Institute for the Butter, Oil and Cheese Industry and the Polish Dairy Industry Institute. It examines the properties of nisin, its possible applications in cheesemaking, methods for determining its activity, and research results concerning the suppression of butyric acid bacteria in different types of cheese (including processed cheese). It is clearly shown that use of nisin cultures does not impair cheesemaking processes but increases their reliability. The book includes a 3-page subject index. ADL

10

Prevention of late blowing in Swiss type cheese by Nisaplin.
El-Gendy, S. M.; Nassib, T. A.; El-Badawi, A. A.
Roczniki Instytutu Przemyslu Mleczarskiego **17** (1) 63-70 (1975) [15 ref. En, pl, ru] [Dep. of Food Tech., Univ. of Assiut, Egypt]

Addition of 50 RU nisin/ml to cheese milk containing 1000 Clostridium tyrobutyricum spores/ml prevented late blowing in Swiss type cheeses. Cheeses made from milk treated with 50 RU nisin/ml had higher total counts than when 0 or 100 RU nisin/ml was used; growth of lactobacilli was inhibited by the nisin and micrococci became predominant. Cheeses containing nisin had a higher pH and lower amino N content than those without nisin. Addition of Cl. tyrobutyricum spores and/or nisin to cheese milk had no marked effect on Eh, moisture content or total chloride content of the cheese. Cl. tyrobutyricum markedly increased the fat acidity of the cheese; this effect was slightly inhibited by nisin. Nisin treatment in Swiss cheese manufacture retarded the ripening process. CDP

11

The use of gel-filtration for the isolation of pure nisin from commercial products.
Wilimowska-Pelc, A.; Olichwier, Z.; Malicka-Blaszkiewicz, M.; Mejbaum-Katzenellenbogen, W.
Acta Microbiologica Polonica **25** (1) 71-77 (1976) [12 ref. En] [Inst. of Biochem., Univ. of Wroclaw, 50-137 Wroclaw, Tamka 2, Poland]

Commercial nisin was fractionated using a Bio-Gel P-10 column and ion-exchange chromatography on CM-sephadex C-25. Pure nisin having a titre of 40×10^6 units/g was obtained. In polyacrylamide gel electrophoresis the pure nisin gave 3 bands. It is suggested that heterogeneity of nisin is due to the presence of several biological polypeptides. The pure nisin is digested by chymotrypsin but it is not affected by TPCK-trypsin (L-1-tosylamide-2-phenylethyl-chlormethyl ketone) and pepsin. AS

12

The assay of nisin in foods.
Fowler, G. G.; Jarvis, B.; Tramer, J.
Technical Series, Society for Applied Bacteriology No. 8, 91-105 (1975) [21 ref. En] [Aplin & Barret Ltd., Yeovil, Somerset, UK]

Three methods of nisin assay are described; (i) semi-quantitative reverse phase assay, (ii) quantitative agar diffusion assay and (iii) the 'nisinase' method. (i) employs spores of Bacillus stearothermophilus suspended in non-nutrient agar; nutrient discs impregnated with an extract of the food to be assayed produce a zone of exhibition containing an inhibition zone, from which the nisin

concn. may be estimated by comparison with known standards. (ii) uses Micrococcus flavus as the test organism in an agar diffusion assay; extracts of foods are diluted with a dilvent prepared from the food itself, allowing compensation to be made for non-nisin intefering substances. (iii) involves extraction of a specific 'nisinase' enzyme from Bacillus cereus cells, a solution of which is reacted with the unknown and standard preparation of nisin, followed by assay as in (ii). This differentiates nisin from other antibiotic materials. JRR

13

[Study of nisin-resistant strains of Streptococcus lactis and Propionibacterium shermanii.]
Lipinska, E.
Roczniki Instytutu Przemyslu Mleczarskiego **17** (2) 15-38 (1975) [Pl, ru, en] [IPM, Warsaw, Poland]

To assess their relative values in cheesemaking and their contributions to cheese-ripening processes, the diagnostic characteristics were studied of the nisin-resistant (P) and normal (K) strains of both Str. lactis $2a_3$ and P. shermanii 1296; the intensities of lactic acid fermentation of the 2 Str. lactis strains and of propionic acid fermentation of the 2 P. shermanii strains in media with or without nisin were determined. In general, the P strain of Str. lactis showed a greater activity of the enzyme systems producing acetoin, diacetyl and CO_2, but was more sensitive to increased temp. and salt concn. than the K strain. Apart from producing more acetoin, the P strain of P. shermanii did not show marked differences from the K strain. The experimental procedure and the bibliography of 145 references are included in the printed full version of the paper, obtainable from the Dairy Industry Research Institute's library in Warsaw. SKK

14

The use of nisin in the production of sterilized milk drinks.
Shehata, A. E.; Khalafalla, S. M.; Magdoub, M. N. I.; Hofi, A. A.
Egyptian Journal of Dairy Science **4** (1) 37-42 (1976) [11 ref. En, ar] [Food Sci. Dep., Fac. of Agric., Ain Shams Univ., Cairo, Egypt]

Addition of nisin at the rate of 10 RU/ml of whole buffaloes' milk or chocolate flavoured milk reduced the thermal processing time required at 250°F from 5 and 5.8 min respectively to 1 min to give commercially sterile products. AS

15

Effect of nisin in saturated brine and storage on the quality of dried bolti fish (Tilapia nilotica).
Zaki, M. S.; El Mansy, H. A. H.; Hassan, Y. M.; Rahma, E. H. A.
Nahrung **20** (7) 691-697 (1976) [10 ref. En, de, ru] [Fac. of Agric., Tanta Univ., Shebin El Kom, Cairo, Egypt]

Fresh eviscerated T. nilotica were brined for 10, 15 or 20 min in saturated brine containing 500 µg nisin/g fish. They were then either (i) sun-dried or (ii) artificially dried (24 h at 30-60°C, 65-84% RH), packaged in polyethylene bags, and stored at room temp. for ≤3 months. At intervals, the TBA value, moisture, fat chloride and total volatile basic N concn. and total and coliform counts were determined. Tables of results are given. The moisture, fat and chloride contents of (i) and (ii) fish were generally similar; changes in these constituents during storage were small. Volatile basic N concn. increased during drying and storage; this increase was greater for (ii) than for (i) samples. (ii) resulted in a slight increase and (i) resulted in a slight decrease in TBA value. With both (i) and (ii) samples, TBA values decreased slightly during storage. Total bacterial count increased during artificial drying then decreased during subsequent storage. The total count of (i) fish decreased slowly during drying and storage. No coliforms were detectable in any sample after brining. IN

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H. BROOKES

ASSISTANT EDITOR

1

Effect of nisin on prolonging the keeping quality of pasteurized milk.
Mahmoud, S. A. Z.; El-Sadek, G. M.; Dawood, A. H. M.
Zentralblatt fuer Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, II 131 (3) 277-284 (1976) [28 ref. En, de] [Microbiol. Dep., Fac. of Agric., Ain Shams Univ., Shoubra, Cairo, Egypt]

Presence of 100-1000 RU nisin/ml had no effect on keeping quality (KQ) of commercially-pasteurized milk at 32°, but extended the KQ at 6° C from 6-7 to >10 days; results were similar whether or not the milk had been inoculated with 1000 Bacillus subtilis spores/ml. KQ of laboratory-pasteurized milk at 32° C was extended from 1 day (control) to 8, 15 and 26 days with 100, 500 and 1000 RU nisin/ml respectively; at 17° C, KQ was extended from 2 days to >1 month in the presence of 500 or 1000 RU nisin/ml. 100-1000 RU nisin/ml had no effect on Gram-negative organisms (Escherichia coli type I, Aerobacter aerogenes type I and Pseudomonas fluorescens) commonly found as contaminants in commercially-pasteurized milk. CDP

2

Effect of nisin on reducing the thermal process in commercially sterilized milk.
El-Sadek, G. M.; Mahmoud, S. A. Z.; Dawood, A. H. M.
Zentralblatt fuer Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, II 131 (3) 285-290 (1976) [10 ref. En, de] [Fac. of Agric., Ain Shams Univ., Cairo, Egypt]

Addition of 200 RU nisin/ml to milk prior to heat treatment at 100° C for 15 min was sufficient to increase the keeping quality from 2 days at 32%C or 7 days at 17° C to >2 months at either temp., even when the milk had been inoculated with 25 000 Bacillus subtilis spores/ml prior to heat treatment. No organoleptic changes occurred due to the nisin treatment. CDP

3

[Wine stabilization technique.]
Hula, P.; Rasko, A.
Czechoslovak Patent 172 045 (1976) [Cs]

3-5 wt.% of nisin is added to must after expressing. While retaining the common wine-making practice, the added antibiotic acts as an inhibitor of the lactic and acetic acid bacteria, eliminating tartaric acid decomposition. Stabilizers can be added in smaller amounts, the additions being 60-70% of present usage. STI

4

Nisin as an aid for extending shelf life of sterilized milk.
Wajid, H. R. A.; Kalra, M. S.
Journal of Food Science and Technology, India 13 (1) 6-8 (1976) [11 ref. En] [Div. of Microbiol., Nat. Dairy Res. Inst., Karnal, Haryana, India]

The presence of 100 Reading Units (RU) nisin/ml in sterilized, homogenized milk (4.5% fat, 8.5% TS) caused a 44.96% reduction in the decimal reduction time (D-value) of Bacillus subtilis 9144 spores at 109° C, and a 71.22% reduction in that of B. stearothermophilus 1-63 spores at 115° C; effect on D-value of B. stearothermophilus spores at 109° C was not significant. The presence of 100 RU nisin/ml extended the shelf life of sterilized milk containing B. subtilis spores (at 37° C) or B. stearothermophilus spores (at 55° C) from 3-7 to ≤60 days when an inoculum of 100 spores/ml was used. CDP

5

[Use of nisin for the preservation of dairy products.]
Teply, M.
Prumysl Potravin 28 (2) 84-86 (1977) [9 ref. Cs] [Vyzkumny Ustav Mlekarensky, Prague, Czechoslovakia]

In Czechoslovakia nisin is permitted as a preservative in processed cheese at a max. concn. of 200 IU/g. Its limitations in the production of natural cheeses (e.g. those made with Lactobacillus helveticus) are pointed out. Work on the application of nisin (Nislaktin of Czechoslovak manufacture) in processed cheese manufacture in Czechoslovakia is briefly reviewed, and reference made to its use in feed mixtures of enhanced nutritional and dietetic effect for young farm animals (piglets, lambs, etc.). FL

6

[Storage of tomato pulp.]
Zhvalevskii, A. S.; Aplyak, I. V.; Titarenko, L. I.
Konservnaya i Ovoshchesushil'naya Promyshlennost' No. 12, 19-20 (1976) [Ru] [Ukrainskii Nauchno-issled. Inst. Konservnoi Promyshlennosti, USSR]

Some existing Soviet techniques of storing pulp in containers, from which it is transported for processing, are reviewed. The DM falls after 8-10 h storage by 0.5-0.6%; the content of volatile acids rises 2-3 times, with simultaneous development of an objectionable microflora. Experimental treatment was carried out by heating the pulp to 70-75° C and adding the following ratios of sorbic acid and an antibiotic (nisin): 0.05:0.02; 0.06:0.01; 0.07:0.02; 0.08:0.01; and 0.1:0.02. Pulp after 72 h storage had 7.4% DM instead of the original 7.6%; 0.5% acid (calculated as malic acid) instead of 0.60%; and 0.024% volatile acids vs. 0.022% in the control sample. Microbial contamination during the first 2 days was almost identical with the initial count; the organisms increased later. Total microbial counts and counts of thermophilic and anaerobic bacteria on special media are interpreted. The tomato pulp can therefore be kept for as long as 3 days, with addition of 0.07% sorbic acid and 0.02% nisin. Only

10 h storage would be acceptable without adding the above stabilizers to pulp heated to 80-85° C and cooled to 20-25° C. STI

7

The use of nisin in the production of sterilized milk drinks.

Shehata, A. E.; Khalafalla, S. M.; El-Magdoub, M. N. I.; Hofi, A. A.

Milchwissenschaft 32 (7) 412, 414-416 (1977) [10 ref. En, de] [Food Sci. Dep., Fac. of Agric., Ain Shams Univ., Shoubra el-Khema, Cairo, Egypt]

Whole buffaloes' milk (BM) and chocolate flavoured milk (described in the preceding abstr.) were treated with 0-400 RU nisin/ml before heat processing at F values of 0.15-5.8. Spoilage at 55° C (for 21 days) was prevented by treatment with 400 RU nisin/ml and an F value of 0.15 or with 10 RU nisin/ml and an F value of 1.0. Addition of nisin enabled the thermal processing time at 250° F to be reduced from 5.0 and 5.8 min for BM and chocolate-flavoured milks respectively to 1 min for each. MEG

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H. BROOKES

ASSISTANT EDITOR

1

[Biologically active substances in milk product manufacture.]
Krsev, L.
Mljekarstvo 27 (10) 236-239 (1977) [4 ref. Sh] [MP 'Dukat', Zagreb, Yugoslavia]

Growth of the vegetative forms of (i) Bacillus stearothermophilus, (ii) Clostridium butyricum, (iii) Cl. tyrobutyricum, (iv) Cl. nigrificans, (v) B. subtilis, (vi) Cl. sporogenes and (vii) Cl. perfringens on thioglycolate media was studied in the presence of nisin. 1 unit/ml inhibited (i), 50 units/ml inhibited (ii) and (iii), and (iv)-(vii) required 50-500 units/ml resp. for complete inhibition. Survival of (vii) spores isolated from processed cheese in the presence of 100, 50, 30 and 10 p.p.m. nisin in the medium was 0, 2.4, 11.2 and 26.8% at the temp. required for destruction of the vegetative form (TD); 0, 1.2, 11.7 and 24.1% at TD + 5°C; 0, 0, 1.4 and 11.0% at TD + 10°C; and 0, 0, 0, and 0.7% at TD + 20°C. Nisin (added as 'Nizaplin' preparation containing 2.5% or 1 million units of nisin/g) in skim milk heated to 110°C for 3, 11 or 40 min retained 84, 57 and 19% resp. of its activity; corresponding values for heating at 115°C were 67, 38 and 7%; and for heating at 120°C, they were 60, 34 and 4%. SKK

2

[Formation of CO_2 by nisin-sensitive and nisin-resistant propionic acid bacteria.]
Kosikowska, M.; Jakubczyk, E.; Lipinska, E.; Lipniewska, D.
Roczniki Instytutu Przemyslu Mleczarskiego 19 (2) 45-51 (1977) [10 ref. Pl, ru, en] [Inst. Przemyslu Mleczarskiego, Warsaw, Poland]

A nisin-sensitive butter starter and its components (Lactobacillus helveticus 80, L. casei 3, and Streptococcus thermophilus 262) were each grown in sterile skim-milk, and a nisin-resistant cheese starter and its components (L. bulgaricus 254, Str. faecalis 137, and L. casei 3P) were each grown in sterile skim-milk supplemented with 300 IU nisin/ml. Propionibacterium shermanii 1296 K sensitive to nisin and P. shermanii 1296 P resistant to 300 IU nisin/ml medium were added to the resulting wheys at concn. of 10^7 cells/ml, and incubated at 30°C. CO_2 production during 15 days incubation was measured. It is concluded from tabulated and graphically presented results that the nisin-sensitive butter starter, nisin-resistant cheese starter, L. bulgaricus and L. helveticus stimulated CO_2 production. Str. thermophilus and Str. faecalis inhibited CO_2 production; and L. casei had no effect. The nisin-resistant strains had more marked stimulatory or inhibitory effects than the sensitive strains. In all wheys, P. shermanii 1296 P produced slightly less CO_2 than P. shermanii 1296 K. [See also FSTA (1977) 9 2P220.] SKK

3

[Use of preservatives in processed cheese manufacture.]
Azis Khadr; Tinyakov, V. G.
Molochnaya Promyshlennost' No. 2, 39-41 (1978) [2 ref. Ru] [Moskovskii Tekh. Inst., Maslodel'noi i Syrodel'noi Promyshlennosti, USSR]

The addition of 150 U of nisin/g inhibited the growth of anaerobic sporeformers in processed cheeses kept at 20° or 35°C without affecting their flavour. When used at the same level in combination with 0.076% sorbic acid it reduced the growth of butyric acid bacteria and prevented mould development. The use of the preservatives permitted a 2-3 fold increase in the shelf life of processed cheese stored at 20-35°C. FL

4

Proteolytic activity of nisin-producing lactic acid streptococci.
Oberman, H.; Gajewska, B.
XX International Dairy Congress E, 461-463 (1978) [En] [Inst. of Fermentation Tech. & Microbiol., Tech. Univ., Lodz, Poland]

21 strains of Streptococcus lactis with different nisin-producing activities were examined for intra- and extra-cellular proteolytic activities. No correlation between nisin production and proteolytic activity was found. [See FSTA (1978) 10 10P1408.] MEG

5

Studies on the effect of different levels of nisin on microbiological quality of processed cheese.
Kumar, J.; Brave, O.
XX International Dairy Congress E, 775-776 (1978) [En] [Allahabad Agric. Inst., Allahabad, India]

Nisin was added to processed Cheddar cheese at 50-200 RU/g, and the samples were stored at 30 ± 1°C for 120 days and tested for coliform, yeast and mould, proteolytic, lipolytic, anaerobic and standard plate counts. Results showed that addition of 100 RU nisin/g processed cheese was sufficient to check any significant increase in bacterial counts during storage. [See FSTA (1978) 10 10P1408.] FL

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H. BROOKES

EDITOR

1

[Determination of antibiotics in milk.] [Review]
Toit, J. J. du
South African Journal of Dairy Technology 10 (2) 87–89 (1978) [12 ref. Af] [Navorsingsinst. vir Vee- en Suiwelkunde, Irene, 1675, South Africa]

This review concentrates on microbiological methods for determining antibiotics in milk. The IDF disk technique [FSTA (1972) 4 3P390] is described in detail, and methods based on changes in acid production or on dye reduction are discussed. Microscopic methods are also briefly reviewed, i.e. methods based on the changes caused by antibiotics in the morphology of lactic acid bacteria. Chemical methods are considered too insensitive for detecting the low antibiotics concn. found in milk. The use of coloured antibiotics preparations to facilitate their detection in milk is mentioned. ADL

2

[Food preservation with Nisaplin, a survey of recent developments.]
Fowler, G. G.
Industrie Alimentari 17 (9) 665–668 (1978) [9 ref. It]

The author discusses the use of the nisin preparation Nisaplin (Aplin & Barrett Ltd., Trowbridge, UK) for controlling anaerobic clostridia in cheese, prolonging the storage life of pasteurized milk and flavoured milk beverages, shortening the treatment time required for evaporated milk, etc. ADL

3

A study of the effect of nisin on the keeping quality of khoa. I. The effect of nisin treatment on the organoleptic properties, acidity and pH of khoa.
Grewal, K. S.; Jain, S. C.
Journal of Research, Punjab Agricultural University 14 (4) 460–467 (1977) [20 ref. En] [Dep. of Food Sci. & Tech., Punjab Agric. Univ., Ludhiana, India]

Khoa prepared from fresh milk was treated with 0, 0.01, 0.015 or 0.02% nisin, and packaged in sorbitol-smeared butter paper. The samples (approx. 300 g each) were tested weekly during 4 wk storage at room temp. (19–30° C) or 4.4° C. Results showed that nisin helped maintain the original flavour of khoa at both storage temp. Body and texture were not affected by nisin addition until the 3rd wk, when the presence of 0.02% nisin prevented the deterioration observed in other samples stored at room temp. Acidity of khoa after 4 wk was inversely related to nisin level, and was higher at room temp. than at 4.4° C at all nisin levels. Acidity increased with time at all nisin levels. Nisin treatment had little effect on pH of khoa apart from a slightly higher pH in nisin-treated than control samples after ≥3 wk at room temp. CDP

4

[Formation of organic acids by nisin-forming strains of Streptococcus lactis.]
Krasnikova, L. V.; Sileva, M. N.
Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya No. 4, 45–47 (1978) [4 ref. Ru] [Leningradskii Tekh. Inst. Kholodil'noi Promyshlennosti, Leningrad, USSR]

5

Antibiotics and antibiosis in agriculture. [Conference proceedings]
Woodbine, M. (United Kingdom, University of Nottingham) (Editor)
386pp. ISBN 0-408-70919-0 (1977) [many ref. En]
London, UK; Butterworth & Co. (Publishers) Ltd.
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This report of the 25th Easter School in Agricultural Science held at Nottingham University in 1976 consists of 27 papers on various aspects of the use of antibiotics in foods and in treatment of animal diseases. These include: A synergic perspective, by M. Woodbine (pp. 27–56, many ref.), in which synergism/combinations in food preservation is discussed; Stress effects and food microbiology, by L. D. Witter & Z. J. Ordal (pp. 131–138, 80 ref.); Recovery and revival of microbial cells, especially those from environments containing antibiotics, by J. E. L. Corry, H. van Doorne & D. A. A. Mossel (pp. 174–196, many ref.); Intramammary therapy: its achievements and limitations, by J. K. L. Pearson (pp. 217–228, 52 ref.), which mentions inhibitory substance residues in milk; Chemicals and heat as ascospore activators, by V. M. Palmer & I. J. McEvoy (pp. 275–283, 13 ref.), which deals with Byssochlamys fulva, B. nivea and Aspergillus fischeri var. glaber; and Antibiotics, animals and man – an appraisal of a contentious subject, by A. H. Linton (pp. 315–343, 113 ref.). A further 4 papers are abstracted separately in FSTA and are in the author index under **United Kingdom,** University of Nottingham [Antibiotics in Agriculture Symposium]. AL

6

Nisin and its applications. (In 'Antibiotics and antibiosis in agriculture' [see FSTA (1979) 11 10C574].) [Lecture]
Lipinska, E. (United Kingdom, University of Nottingham)
pp. 103–130 (1977) [many ref. En] [Inst. of Dairy Ind., Warsaw, Poland]

This review-type paper described the structure and physico-chemical properties of nisin, and its mode of action and biosynthesis. Health and legal aspects of the use of nisin considered include toxicological data, hazards caused by nisin-resistant bacteria, nutritive values of nisin-treated foods and the acceptance of nisin as a food additive. Analytical methods for determining nisin are mentioned briefly. An outline is given of the practical applications of nisin in canned and semi-preserved foods such as sterilized and flavoured milks, processed cheese and spreads, tomatoes, green peas, other vegetables and fruits, puddings, hot-vended meals, soups and sauces, meat, fish, sausages and sandwich pastes, and in cheese manufacture. MEG

7

[New instructions for the detection of antibiotics in farm milk.]
Francois, A.
Revue Laitiere Francaise No. 373, 27–31 (1979) [6 ref. Fr]

The 'Antibiotics' Commission of the Centre National de Coordination des Etudes et Recherches sur la

Nutrition Animale (CNERNA) considers the methods proposed by CNERNA in 1971 (preliminary testing by the acidification method and confirmation by the gel diffusion method) still to be of value for detecting antibiotics in farm milk. The Commission prescribes storage temp. for samples that are not tested on the day of arrival, and describes in detail procedures to be used in the tests, introducing greater precision to the gel diffusion test. CDP

8

[Antibiotic assay method for fermented milk drinks.]
Kang, K. H.; Lee, S. W.; Baek, Y. J.; Kim, Y. C.
Korean Journal of Animal Science 20 (6) 605–612 (1978) [30 ref. Ko, en] [Han Kuk Yakult Inst. for Dairy Tech. & Microbiol., Yung Deung Po-Ku, Seoul, S. Korea]

A comparison was made of 3 methods for measuring antibiotics residues in milk: (i) the cylinder plate assay with Bacillus stearothermophilus subsp. calidolactis as test organism, (ii) the cylinder plate assay with Micrococcus luteus as test organism and (iii) the triphenyltetrazolium chloride dye reduction method with Streptococcus thermophilus as test organism. Method (i) could detect 0.0025 units penicillin/ml vs. 0.01 and 0.03 units/ml for (ii) and (iii) resp. Using method (i) it was shown that the presence of organic acids, such as lactic acid, affected the size of the inhibition zone produced by fermented milk samples. This effect could be overcome by adjusting the pH of the fermented milk to 6.0. The size of the inhibition zone decreased with increasing sugar content in the sample. Method (i) could detect 0.005 units penicillin/ml fermented milk. [From En summ.] MEG

9

Nisin: its preservative effect and function in the growth cycle of the producer organism. [Lecture]
Hurst, A.
Society for Applied Bacteriology Symposium Series No. 7, 297–314 (1978) [many ref. En] [Health Protection Branch, Health & Welfare Canada, Ottawa, Canada]

The use of nisin as a food preservative is reviewed, with particular reference to its properties, and the technical and public health consideration in its use in food. The function of nisin and its synthesis in the growth cycle of Streptococcus lactis is discussed in detail. [See FSTA (1979) 11 10C580.] JMa

10

Method for antibiotic determination in animal tissue, as applied to lasalocid. [Lecture]
MacDonald, A.
Journal of the Association of Official Analytical Chemists 61 (5) 1214–1221 (1978) [17 ref. En] [Hoffmann-La Roche Inc., Anim. Health Res., Nutley, New Jersey 07110, USA]

The development of a tissue residue method for an antibiotic is dependent on the history of the overall problem, the current requirements that must be met for regulatory approval, the chemistry of the compound, its physical/chemical parameters, and its microbiological spectrum for the best possible fit of all of these to ensure a procedure that will work reliably in the originator's laboratory and to the same degree of effectiveness in any other laboratory. A note is made of those factors that must be included as controls on the procedure and those experiments that must be included to differentiate matrix from method influences. The specific case of lasalocid, used as a coccidiostat in poultry production, is considered. [See FSTA (1979) 11 4C194.] AS

11

Detection of antibiotic residues in slaughtered animals. (In 'Antibiotics and antibiosis in agriculture' [see FSTA (1979) 11 10C574].) [Lecture]
McCracken, A.
pp. 239–244 (1977) [7 ref. En] [Vet. Res. Lab., Stormont, Belfast, UK]

The method used in Northern Ireland to detect antibiotic residues in animal tissues is briefly described [see FSTA (1976) 8 7R418]. The method can detect levels of ampicillin, penicillin and oxytetracycline well below the standards set by FAO/WHO, but neomycin and chloramphenicol can only be detected at levels of 3.5 and 0.5 mg/g muscle, resp. Work to determine the extent of penicillin, ampicillin and oxytetracycline residues in various tissues of calves is described, and results are compared (tables given) with the official testing method of the Netherlands [Schothorst & Peelen-Knol (1970) Netherlands Journal of Veterinary Science 3, 85]. AL

12

The potential of nisin.
Fowler, G. G.
Food Manufacture 54 (2) 57, 59 (1979) [En]

The uses of nisin, an antimicrobial complex elaborated by Streptococcus lactis, in food products is discussed. Nisin is polypeptide in nature and in the correct dosage can efficiently control Gram-positive bacteria; usage to prevent spoilage by anaerobic Clostridium spp. in processed cheese and other dairy products, to inhibit germination of heat resistant spores (of e.g. Bacillus stearothermophilus or Cl. thermosaccharolyticum) in low-acid canned products, and to control mesophilic aciduric organisms such as B. coagulans and Cl. pasteurianum in acid-pack canning, is briefly discussed. JRR

13

[Utilization of nisin in cooked sausages and other cured meat products.]
Caserio, G.; Ciampella, A.; Gennari, M.; Barluzzi, A. M.
Industrie Alimentari 18 (1) 1–12, 19 (1979) [28 ref. It] [Istituto Ispezione Alimenti di Origine Anim., Univ. degli Studi di Milano, Milan, Italy]

Studies were conducted on samples of (i) Mortadella and (ii) Wurstel sausages and (iii) ham, at nisin levels of 0, 10, 15 or 20 g/100 kg for (i) and (ii), and 0, 10 or 20 g/100 kg for (iii). Some (i) and (ii) samples with 20 g nisin/100 kg were artificially contaminated with staphylococci and spores of sulphite-reducing clostridia. (i), (ii) and (iii) samples were vacuum-packaged and stored for up to 3 months at 0–2° or 20°C. At monthly

intervals, the organoleptic properties were evaluated, total counts and counts of pathogenic staphylococci and sulphite-reducing clostridia were determined, together with nisin residue concn. Results are discussed in detail. Overall, it is concluded that addition of nisin at 20 g/100 kg is advantageous; effects of lower levels of nisin are relatively small. Inhibitory effects of nisin on staphylococci and clostridia are discussed. AJDW

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Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

EDITOR

1

Food preservation with Nisaplin.
Fowler, G. G.
Food Technology in New Zealand 14 (2) 3, 5, 7 (1979) [9 ref. En] [Aplin & Barrett Ltd., Trowbridge, Wiltshire, UK]

The use of Nisaplin, a commercial nisin preparation, for antimicrobial activity in foods is described. Applications include inhibition of Clostridia in processed cheese and to extend the shelf-life of pasteurised whole milk. Nisin can also be used to inhibit the germination of heat resistant spores of spoilage organisms such as *Bacillus stearothermophilus* in canned low-acid packs of products like soups and vegetables. JRR

2

The effect of nisin on the keeping quality of khoa. II. The microbiological quality and fat deterioration in khoa.
Grewal, K. S.; Jain, S. C.
Journal of Research, Punjab Agricultural University 15 (1) 62–67 (1977) [10 ref. En] [Dep. of Food Sci. & Tech., Punjab Agric. Univ, Ludhiana, India]

Levels of 0.01, 0.015 and 0.02% nisin were incorporated in khoa prepared as described in part I [FSTA (1979) 11 6P919]. The khoa was packaged in parchment paper and stored at 4.4°C or room temp. (19–30.1°C) for up to 4 wk. Liberation of free fatty acid (as oleic acid) increased significantly with time, especially at room temp.; peroxide values showed a similar trend. Different nisin levels did not significantly influence acid or peroxide values, although highest figures for either value after 4 wk at room temp. and 4.4°C, resp., occurred in khoa prepared with 0.01 and 0.015% nisin. Yeast + mould and total bacterial counts increased with time, especially at room temp., and were not influenced by nisin level at 4.4°C; at room temp., all khoa samples showed a significant increase in total bacterial counts with time, the magnitude of this increase declining with increasing nisin concn. CDP

3

[Effect of nisin and nitrite, separately and together, on spore germination of *Clostridium perfringens* in cooked meat emulsions.]
Caserio, G.; Stecchini, M.; Pastore, M.; Gennari, M.
Industrie Alimentari 18 (12) 894–897, 900 (1979) [25 ref. It] [Istituto di Ispezione degli Alimenti di Origine Anim., Univ. di Milano, Milan, Italy]

In continuation of earlier work on the effect of nisin on the keeping quality of hams, Mortadella and Wurstel sausages [see FSTA (1979) 11 11S1780]. 3 series of tests were carried out to determine effects of nisin and/or nitrite on *Cl. perfringens* spores in Wurstel sausage meat. The 1st, preliminary, series aimed at evaluating the heat stability of the spores (200/g) in the presence of 20 g/100 kg nisin + 0, 75 or 150 p.p.m. $NaNO_2$ after heating at 72°C for 1 h and subsequent storage for 1 and 8 days at 6–8°C. Nisin + nitrite (either concn.) effectively inhibited spore germination. In the 2nd series, Wurstel sausages were inoculated with 70 spores/g and treated as in the 1st series (but with 100 instead of 150 p.p.m. nitrite) and stored for 1–38 days at 2–4°C, 33 days at 4–6°C or 20 days at 20°C. Best results were obtained with nisin + 75 p.p.m. nitrite, which killed off the spores or prevented germination, but did not affect the sensory characteristics of the product. In the 3rd series of tests, the residual concn. of nisin was determined in Wurstel sausages after 28 days at 2–4°C; the concn. found was 43% of the initial level of 20 p.p.m. HBr

4

[Residues of veterinary drugs in foods of animal origin after treatment of livestock. List of official withdrawal periods before marketing.]
Rückstandsbildung in Lebensmitteln nach Arzneimittelanwendung in der Tierproduktion (Karenzzeitliste für Tierarzneimittel).
Laue, W.; Scheibner, G.; Baldauf, S.; Trolldenier, H.; Pietsch, W.
Monatshefte für Veterinärmedizin 34 (23) 897–901 (1979) [De, en, ru] [Bezirksinst. für Veterinärwesen, Berlin]

Residues of veterinary drugs in foods of animal origin may present a health hazard or impair the organoleptic or processing properties of foods. To avoid occurrence of such residues in foods, treatment must be terminated before marketing of animals or their products for food use. A list is given of German Democratic Republic official delay periods before marketing of food from animals treated with antibiotics, sulphonamides or antiparasite agents. IN

5

[Preservation of foods by nisin. View of recent developments.]
Fowler, G. G.
Revue des Fermentations et des Industries Alimentaires 34 (5) 157–159 (1979) [9 ref. Fr] [Aplin & Barrett Ltd., Trowbridge, Wilts., UK]

This brief survey of the use of nisin as a preservative for foods includes tabulated data on the composition of Nisaplin, the commercial nisin preparation produced by Aplin & Barrett Ltd., Trowbridge (UK); its bacteriological characteristics, the min. Nisaplin concn. required to inhibit *Clostridium sporogenes* spores; and the dosage requirements and consequent residual contents of Nisaplin in the final product (specific reference to soft cheese). Brief mention is made of other potential applications for nisin, e.g. other dairy products, and canned soups, legumes and tomatoes. KME

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FAB 36

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FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of:-

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INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts on specific topics in food science and technology. The topics are chosen by the staff of the International Food Information Service as being of particular interest or importance. The topics normally interest individual workers, who may not require the full information provided in Food Science and Technology Abstracts, from which the abstracts for FABs are taken. The size and the cost of the FABs are controlled as much as possible with the interests of individual workers in mind.

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Some of the larger FABs have been divided into sections to facilitate use. FAB 47 also has a subject and author index provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technolggy Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

EDITOR

1

[Conditions of biosynthesis of nisin with lactic fermentation streptococci during continuous cultivation.]
Krasnikova, L. V.; Vasil'ev, N. F.; Sileva, M. N.; Voronina, L. N.; Litvinova, M. N.
Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya No. 5, 35-37 (1979) [10 ref Ru] [Leningradskii Tekh. Inst. Kholodil'noi Promyshlennosti, Leningrad, USSR]

Optimal conditions for continuous cultivation of *Streptococcus lactis* 24 were studied to ensure rapid growth of the culture and max. synthesis of the antibiotic. *Str. lactis* 24 was cultivated in whey with 10% enzyme-hydrolysed milk. STI

2

Distribution and residues of macrolide antibiotics in normal dairy cows.
Nouws, J. F. M.; Ziv, G.
Archiv für Lebensmittelhygiene 30 (6) 202-208 (1979) [23 ref. En] [Vleeskeuringsdienst, Havenweg 2, Nijmegen, Netherlands]

Holstein-Friesian dairy cattle were used in a study on distribution and persistence of residues of macrolide antibiotics in tissues, milk, bile and urine. Cows were treated with spiramycin, erythromycin, tylosin or clindamycin-based preparations by intravenous or intramuscular injection, or with intramammary preparations containing spiramycin/colimycin, erythromycin or clindamycin. Residues were determined in renal cortex, renal medulla, muscle, liver, lung, serum, bile, milk and urine at various intervals after administration, by microbiological methods using *Sarcina lutea, Escherichia coli* or *Bacillus subtilis* BGA (at pH 6.0 or 8.0). Tables and graphs of results are given and discussed in detail. Antibiotic concn. and residue persistence were considerably greater in kidney and liver than in muscle tissue. The *S. lutea* test was superior to the other techniques evaluated. It is therefore suggested that the *S. lutea* test on muscle samples should be used for testing for macrolide antibiotic residues in carcasses. No antibiotic residues could be detected in the meat of the cows treated with intramammary preparations. Data for antibiotic residue concn. in milk support the concept of non-ionic passive diffusion of drug residues from serum to milk. AJDW

3

Growth and biosynthesis of aflatoxin by *Aspergillus parasiticus* in cultures containing nisin.
Yousef, A. E.; El-Gendy, S. M.; Marth, E. H.
Zeitschrift für Lebensmittel-Untersuchung und -Forschung 171 (5) 341-343 (1980) [14 ref. En. de] [Dep. of Food Sci. Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Nisin, 200 or 5000 Reading units/ml, was added to *Aspergillus parasiticus* cultures. The cultures were incubated at 28°C for 3, 7 or 10 days and analysed for mycelial dry wt., pH and accumulation of aflatoxins B_1 and G_1. During the first 3 days of incubation, dry wt., pH decrease and aflatoxin accumulation were suppressed by nisin, when compared with similar values for the nisin-free control. After longer incubation, differences in dry wt. and pH values decreased, whereas accumulation of aflatoxin in the nisin-containing cultures surpa ssed that of the control. AS

4

A kinetic study of beta-lactam antibiotic residues in normal dairy cows.
Nouws, J. F. M.; Ziv, G.
Zentralblatt für Veterinärmedizin, A 25 (4) 312-326 (1978) [17 ref. En, de, fr, es] [Meat Inspection Service, Havenweg 2, Nymegen, Netherlands]

A better estimation of preslaughter withdrawal times for animal tissues treated with beta-lactam antibiotics (benzylpenicillin, cephpirin, cephacetrile, cloxacillin, amoxycillin, and ampicillin) is proposed, based on simultaneous detn. of drug concn. in muscle drip, kidney cortex, and serum during the elimination phase of the drug. Each drug examined gave a uniform drip:serum concn. ratio, so rate of drug elimination from muscle drip can serve as a means of calculating the necessary pre-slaughter withholding period to give any desirable drug residue tolerance level. Examples of such calculations are presented. [From En summ.] LH

5

Efficacy of certain antibiotics in the control of postharvest decay of papaya fruits.
Prasad, J. S.; Verma, R. A. B.
Phytoparasitica 8 (2) 105-108 (1980) [13 ref. En] [Univ. Dep. of Botany, Mithila Univ., Darbhanga, India]

Evaluations were made of 4 antibiotics, viz., ampicillin, griseofulvin, aureofungin and mycostatin, against *Alternaria tenuis, Chaetomium globosum, Curvularia lunata, Cylindrocarpon tonkinense, Fusarium oxysporum* and *Helminthosporium spiciferum* causing postharvest fruit rots of papaya (*Carica papaya* L.). A fruit dip treatment in 1000 p.p.m. of aureofungin proved to be the most effective in controlling rots due to the above organisms, with mycostatin (1000 p.p.m.) second best. AS

6

[Detection, isolation and identification of antibiotic residues in milk. V. Streptomycins.] Untersuchungen über Nachweis, Isolierung und Identifizierung von Antibiotika-Rückständen in der Milch.
V. Streptomycine.
Hamann, J.; Heeschen, W.; Tolle, A.
Milchwissenschaft 34 (8) 479-480 (1979) [9 ref. De, en] [Bundesanstalt für Milchforschung, Kiel, Federal Republic of Germany]

A procedure for extraction of streptomycin residues from milk, based on those of Bossuyt et al. [FSTA (1977) 9 1P179] is described in detail. The extracts were fractionated by TLC on cellulose using methanol/3% NH_4Cl (70:30); and streptomycin and dihydrostreptomycin were determined using *Bacillus cereus* ATCC 11778. Similar results were also obtained omitting the extraction step, the 30-ml milk sample being centrifuged at 3000 rev/min for 10 min, filtered and applied directly to the TLC plate; the procedure was as described above, except that dichloromethane/methanol/85% acetic acid (85:10:5)

followed by methanol/3% NH_4Cl (70:30) were used as mobile phases. Sensitivities were 0.1–1 and 0.5–1 p.p.m. for streptomycin and dihydrostreptomycin, resp. [See preceding abstr. for part IV.] SKK

7

[Detection, isolation and identification of antibiotic residues in milk. VI. Inhibition of lactate formation as measuring criterion in screening test for detection of antibiotic substances.] Untersuchungen über Nachweis, Isolierung und Identifizierung von Antibiotika-Rückständen in der Milch. VI. Die Hemmung der Laktatbildung als Messkriterium im Screening-Test zum Nachweis antibiotisch wirksamer Substanzen.
Hamann, J.; Heeschen, W.; Tolle, A.
Milchwissenschaft 35 (9) 544–546 (1980) [6 ref. De, en] [Bundesanstalt für Milchforschung, Kiel, Federal Republic of Germany]

Inhibition of lactate formation was determined by (i) the method described in part III [FSTA (1975) 7 12P2601] or (ii) by measurement of pH changes using 'Orion research 201' digital pH meter. For (i), milk samples were heated to 80°C for 5 min in a water-bath, divided into 2 portions, yoghurt starter (from a bulk kept in 0.4 ml doses in liquid N_2) was added to both, and 1 was treated with formaldehyde immediately, and the other after incubation at 45°C for 30, 45 or 60 min alone or in the presence of different concn. of penicillin, streptomycin, chloramphenicol or tetracycline. For (ii), pH was measured directly or after incubation as for (i) in the presence or absence of graded amounts of the named antibiotics. Results presented in detail show that with either method of measurement of extent of inhibition of lactate formation, sensitivity limits of antibiotics detection were: 0.01 IU penicillin, 0.05 μg streptomycin, 0.1 μg chloramphenicol, and 0.05 μg tetracycline/ml. Except for penicillin, these limits are lower than those of the Brilliant Black reduction test. [See preceding abstr. for part V.] SKK

8

Lactoferrin — antibacterial protein of milk.
Chander, H.; Batish, V. K.; Bhatia, K. L.
Indian Dairyman 32 (5) 417–418 (1980) [5 ref. En] [Div. of Dairy Bact., Nat. Dairy Res. Inst., Karnal-132 001, India]

This paper considers the content of lactoferrin in milks of different species, the role of Fe in the bacteriostatic action of lactoferrin, and antibacterial properties of lactoferrin against different types of organisms. CFTRI

9

Psychrotrophic *Lactobacillus plantarum* from fish and its ability to produce antibiotic substances. (In *'Advances in fish science and technology'* [see FSTA (1981) 13 6R300].) [Lecture]
Schroder, K.; Clausen, E.; Sandberg, A. M.; Raa, J.
pp. 480–483 (1980) [18 ref. En] [Inst. of Fisheries, Univ. of Tromso, Tromso, Norway]

A bacterial isolate (code name UTC 101-11) resembling *L. plantarum* was obtained from the gut of saithe (*Gadus virens*) and subjected to various studies including: detn. of growth and metabolism in 3 liquid media; measurement of lactic acid production; analysis of cells for diamino pimelic acid; examination of antibiotic production via growth kinetics and plate diffusion assays utilizing *Vibrio* sp.; and examination of the production of an antibiotic culture filtrate, antibiotic production by *L. plantarum* being triggered by adding culture filtrates of other bacteria (e.g. *Bacillus thuringiensis*) to the growth medium. The *L. plantarum* isolate was able to kill a mixed culture of catalase-positive bacteria, after an initial phase of rapid growth by the catalase-positives. The catalase-positives died before the pH had dropped to a bactericidal level, suggesting that the isolate produces antibacterial principles other than acid. However, filtrates of the isolate grown in shake culture had no detectable antibiotic activity, unless extracts of other bacteria were added to the medium prior to growth of the isolate. The mode of action of the antibacterial factor(s) produced by the isolate is not yet known. JA

10

[Tiamulin, a new antibiotic in veterinary medicine.] [Review]
Carli, S.; Giulioni, A.
Rivista di Zootecnia e Veterinaria No. 4, 251–266 (1980) [43 ref. It, en] [Istituto di Farmacologia, Tossicologia & Terapia Sperimentale Vet., Univ. degli Studi di Milano, Milan, Italy]

This review on the antimicrobial activity, mode of action, toxicity, metabolism and applications of the new semisynthetic diterpene antibiotic tiamulin includes tables of literature data for persistence of tiamulin residues in edible tissues of treated pigs and chickens. AJDW

11

The use of nisin in canned okra.
El-Samahy, S. K.; Elias, A. N.
Egyptian Journal of Food Science 5 (1/2) 79–81 (1977) [6 ref. En] [Food Tech. Dep., Fac. of Agric., Zagazig Univ., Cairo, Egypt]

Investigations were carried out into the use of nisin for the sterilization of canned green okra. Cleaned and washed okra was scalded in water and filled in cans, then 2% NaCl (to which citric acid was added to give a pH of approx. 5.2) was added. The cans were inoculated (150 mil) with *B. stearothermophilus*, in the presence (20 p.p.m.) or absence of nisin. Samples without nisin and spores were used as the control. Sterilization was carried out at 120° for 15 and 30 min, and after cooling the cans were stored at 55° for 3 wk. Development of 'flat-sour' spoilage was shown by bacterial culturing and by measuring the pH values. Number of cans showing 'flat-sour' spoilage was 5/30 for the 30 min heating time without nisin and 20/30 for the 15 min heating time without nisin. pH of okra in brine was about 5.15 after processing. pH in cans showing 'flat-sour' spoilage decreased to pH 4.20. Sterilization of the control for 30 min at 120° was sufficient to prevent spoilage. When okra was inoculated, normal heat treatment was insufficient to inhibit *B. stearothermophilus* especially

when sterilization time was reduced. Addition of 20 p.p.m. nisin to 250 g cans completely inhibited the growth of the organism in inoculated cans given reduced time of heat treatment. It was concluded that nisin reduced the time of heat treatment thus improving the keeping quality of the final product and maintaining its fresh colour. VJG

12

Effect of nisin on the outgrowth of *Clostridium botulinum* spores.

Scott, V. N.; Taylor, S. L.

Journal of Food Science 46 (1) 117–120, 126 (1981) [19 ref. En] [Food Res. Inst, 1925 Willow Drive, Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Nisin, an antibiotic produced by certain strains of *Streptococcus lactis*, is effective in preventing outgrowth of *Clostridium botulinum* spores. Type A *C. botulinum* spores were the most resistant to the inhibitory action of nisin, requiring 1000–2000 IU nisin/ml for a 50% inhibition of outgrowth on TPYG agar plates. Type E spores were more sensitive, requiring only 50–100 IU/ml for 50% inhibition of outgrowth. Type B spores displayed an intermediate level of sensitivity, requiring 500–1000 IU nisin/ml for 50% inhibition of outgrowth. Similar levels of nisin were necessary to prevent spore outgrowth in TPYG broth and BHI broth over a 7-day incubation period. With prolonged incubation periods of up to 65 days in TPYG broth, spore outgrowth was observed sporadically at higher nisin levels with the type A and B spores which may indicate some decomposition of nisin with storage. Nisin levels of 5000 IU/ml for type A spores and 2000 IU/ml for the type B and Minnesota E spores were insufficient to prevent spore outgrowth by *C. botulinum* in cooked meat medium. For the Beluga E spores, a nisin level of 2000 IU/ml was necessary to prevent spore outgrowth in cooked meat medium. The need for higher levels of nisin in cooked medium to prevent spore outgrowth may be due to the binding of the nisin by meat particles. [See following abstr.] IFT

13

Temperature, pH, and spore load effects on the ability of nisin to prevent the outgrowth of *Clostridium botulinum* spores.

Scott, V. N.; Taylor, S. L.

Journal of Food Science 46 (1) 121–126 (1981) [9 ref. En] [Food Res. Inst., 1925 Willow Drive, Univ. of Wisconsin, Madison, Wisconsin 53605, USA]

The effectiveness of nisin in preventing the outgrowth of spores of *Clostridium botulinum* types A, B and E in TPYG broth was profoundly affected by pH, temp. of heat-shocking, length of heat-shocking period, and spore load. Nisin was considerably more effective at pH 6 than at either pH 7 or pH 8 in limiting the outgrowth of all 6 tested strains. Heat-damaged spores were also more sensitive to nisin. Both higher heat-shocking temp. in the range 20–30°C higher than the optimal heat-shocking temp. for the particular strain and longer heat-shocking periods served to lower the levels of nisin required to inhibit spore outgrowth. Nisin was more effective against spore loads of 10^2 spores/ml than higher spore loads of 10^3 or 10^4 spores/ml. With all of these variables taken into consideration, the order of sensitivity of the spores of the various strains of *C. botulinum* was strain 56A < strain 69A < strain 113 B = strain 213 B < strain Beluga E < strain Minnesota E. [See preceding abstr.] IFT

14

Nisin: a possible alternative or adjunct to nitrite in the preservation of meats.

Rayman, M. K.; Aris, B.; Hurst, A.

Applied and Environmental Microbiology 41 (2) 375–380 (1981) [35 ref. En] [Bureau of Microbial Hazards, Health Protection Branch, Health & Welfare Canada, Ottawa, Ontario K1A 0L2, Canada]

Nisin at 75 p.p.m. (75 μg/g) was superior to 150 p.p.m. of nitrite in inhibiting outgrowth of *Clostridium sporogenese* PA 3679 spores in meat slurries, which had been heated to simulate the process used for cooked ham. The inhibitory activity of nisin decreased as the spore load or pH of the slurries increased. Unlike nitrite, inhibition by nisin was unaffected by high levels of Fe either as a constituent of meats or when added as an Fe salt. In slurries treated with 75 p.p.m. nisin, refrigerated storage for 56 days resulted in depletion of nisin to a level low enough to allow outgrowth within 3 to 10 days if the slurries were subsequently abused at 35°C. In contrast, a combination of 40 p.p.m. nitrite and either 75 or 100 p p.m. nisin almost completely inhibited outgrowth in these slurries. The nisin-nitrite combination appeared to have a synergistic effect, and the low concn. of nitrites was sufficient to preserve the colour in meats similar to that of products cured with 150 p.p.m. nitrite. AS

15

[Biological availability of subcutaneously injected chloramphenicol and its excretion in cows' milk.]

Bioverfügbarkeit von Chloramphenikol nach subkutaner Applikation und Ausscheidung mit der Milch bei Kühen.

Laue, W.; Hollstein, E.; Zapff, G.

Monatshefte für Veterinärmedizin 35 (9) 344–346 (1980) [4 ref. De, en, ru] [Bezirksinst. für Veterinärwesen Berlin]

Subcutaneous injection of dairy cows with chloramphenicol (15 mg/kg livewt., twice daily for 3 days) resulted in therapeutically efffective levels of the drug in the blood. Concn. of the drug in milk reached > 1 mg/kg, and the drug appeared in the milk for up to 12 days after treatment. RBS

16

Antibiotic residues in milk from individual quarters after intramammary treatment.

Freke, C. D.; Bates, P.

New Zealand Journal of Dairy Science and Technology 16 (1) 19–24 (1981) [8 ref. En] [Ruakura Agric. Res. Cent., Hamilton, New Zealand]

5 antibiotic preparations (3 penicillin, 1 streptomycin and 1 cloxacillin) were each used to treat 5 cows by 3 intramammary infusions into 2 quarters. Mid-stream

milk samples were taken from each quarter at alternate milkings for 6 days after the last infusion, and assayed for antibiotics by a modified large plate assay with *Bacillus stearothermophilus* (sensitivity 0.001 IU penicillin/ml). The 3 penicillin preparations were detected in milk for 7–9 milkings and streptomycin and cloxacillin for at least ≥11 milkings. Results suggest a log/log relationship between time and antibiotic concn. There was considerable variation between individual determinations and in many cases the antibiotic was still detectable after the statutory holding time of 6 milkings. Little or no antibiotic was detected in milk from untreated quarters, even at the time of the last antibiotic infusion, so isolation of milk from treated quarters only is suggested. CDP

17

Process for the removal of antibiotics from milk.
Charm, S. E. (Penicillin Assays Inc.)
United States Patent 4 238 521 (1980) [En]

Penicillin-contaminated milk is contacted with a bed of particulated, food grade, reactivated charcoal at a temp. of 4–45°C (preferably <15°C), the milk being recycled through the charcoal bed for 2 min–2 h to obtain penicillin-free milk. The activated charcoal is regenerated periodically by contacting it with hot or boiling water. EJM

18

Antibiotic resistances of yogurt starter cultures *Streptococcus thermophilus* and *Lactobacillus bulgaricus*.
Sozzi, T.; Smiley, M. B.
Applied and Environmental Microbiology 40 (5) 862–865 (1980) [16 ref. En] [Res. Dep., Nestle Products Tech. Assistance Co. Ltd., CH-1814 La Tour de Peilz, Switzerland]

29 strains of *L. bulgaricus* and 15 of *Str. thermophilus* were tested for resistance to 35 antibiotics, using the disk assay technique. All strains were sensitive to 0.5 μg ampicillin, 10 μg aureomycin, 5 units bacitracin, 50 μg carbenicillin, 30 μg cephaloridin, 30 μg cephalothin, 5 μg chloromycetin, 2 μg clindamicin, 1 μg dicloxacillin, 30 μg doxycycline, 2 μg erythromycin, 3 μg Mandelamine, 5 μg methicillin, 15 μg oleandomycin, 0.5 units penicillin G, 5 μg rifampin, 10 μg terramycin or 1 μg tetracycline. Most of *Str. thermophilus* and *L. bulgaricus* strains were resistant to neomycin and polymyxin B, both of which are used in mastitis therapy. Compared with previous results obtained by Reinbold & Reddy [see FSTA (1975) 7 10P2234], there was a marked increase in the number of *Str. thermophilus* strains that were resistant to antibiotics used in mastitis therapy. With *L. bulgaricus* there was a reduction in the number of strains resistant to certain antibiotics, for which resistance had previously been reported; no strains were resistant to tetracycline or oleandomycin. For the manufacture of yoghurt, it is considered prudent to use strains of *L. bulgaricus* and *Str. thermophilus* that are resistant to as few antibiotics as possible. In this way, unnecessary distribution of antibiotics-resistant strains is avoided. MEG

19

[Instructions for the detection of antibiotics and sulphonamides in farm milk.]
France, Centre National de Coordination des Etudes & Recherches sur la Nutrition Animale (CNERNA)
Revue Laitiere Francaise No. 395, 7, 9, 11, 13–14, 16–17 (1981) [3 ref. Fr]

Using procedures recommended previously by the 'Antibiotics' commission of CNERNA [see FSTA (1979) 11 10P1788], a significant proportion of samples found positive in the preliminary acidification test were negative in the confirmatory gel diffusion test. Improvements proposed in this paper are that results of the preliminary test should be classified as negative, doubtful or positive, and that doubtful samples should be tested against (i) *Bacillus megaterium* and (ii) *B. subtilis* as well as against (iii) *B. stearothermophilus* in the confirmatory test; the (iii) test is particularly sensitive to penicillins and tetracyclines, (ii) to aminosides (streptomycin, neomycin, kanamycin etc.) and macrolides (erythromycin, spiramycin) and (i) to sulphonamides and most antibiotics, particularly chloramphenicol. Procedures are described for each test. CDP

20

Effect of common dairy farm detergents and sanitizers on the standard test for antibiotic residues.
Freke, C. D.; Booker, R.
New Zealand Journal of Dairy Science and Technology 16 (1) 87–88 (1981) [2 ref. En] [Nat. Dairy Lab., Ruakura Agric. Res. Cent., Private Bag, Hamilton, New Zealand]

12 different types of dairy farm detergents and disinfectants were tested for their effects on results of the STAR test (Biological Laboratories Ltd., Auckland) which utilizes *Bacillus stearothermophilus*. In all cases, the concn. of product required to produce a positive result was far greater than would be present in the milk if the product had been used according to the manufacturer's directions. Products tested were: NaOH-based and alkali detergents; quaternary ammonium compounds and I cleaners and udder preparations; H_3PO_4 cleaners; chlorhexidine glucanate (Hibitane); hexachlorophene creams; calcium hypochlorite; non-ionic products; and phenols and chlorinated phenols. CDP

21

[Antibiotic properties against *Clostridium botulinum* B of *Clostridium sporogenes* strains isolated from canned meat.]
Mierzejewski, J.
Medycyna Weterynaryjna 35 (4) 220–222 (1979) [9 ref. Pl, ru, en] [ul. Krancowa 1/15, 24-100 Pulawy, Poland]

249 strains of *C. sporogenes* isolated from 500 blown meat cans that had been kept 1–4 yr without refrigeration (including 178 isolated from 287 cans of ground pork) were examined. 56 (22%) of the strains were found to produce bacteriocines against *C. botulinum* B 1162. Cultures of the 4 most active

strains reached max. activity after incubation for 2–3 days. The strains exhibited antibiotic activity also against *C. perfringens* A and a museum strain of *C. sporogenes*, but to a lesser extent than against *C. botulinum*. SKK

22

[Detection of residues of antibiotics and other antimicrobial agents in foods.]
Billon, J.; Tao, S. H.
RTVA 19 (164) 9–17 (1980) [26 ref. Fr] [Lab. Cent. d'Hygiene Alimentaire, 43, Rue de Dantzig, 75015 Paris, France]

Problems with residues of feed antibiotics in foods of animal origin are briefly discussed, with reference to allergy of consumers to antibiotics, and selection for antibiotic-resistant bacteria. French legislation for residues of antibiotics in foods is summarized. Detailed descriptions are given of methods for detection of residues of antibiotics in fresh meat and offal, with reference to methods based on formation of inhibition zones on agar plates seeded with *Bacillus subtilis* or *Micrococcus luteus*, and electrophoretic separation of antibiotics residues from interfering substances before microbiological testing. AJDW

23

[Antibiotics and their utilization in the food industry.] Antibiotika a jejich pouziti v potravinarskem prumyslu. [Book]
Hejzlar, M.; Hylmar, B.; Teply, M.
281 pp. (1980) [many ref. Cs] Prague, Czechoslovakia; SNTL. Price 33.Kcs

The fundamental properties of antibiotics are covered, as well as their classification, action and laboratory control. Chapters are: Antibiotics and their basic characteristics (pp. 11–107); Antibiotics in the food industry (pp. 108–127); Antibiotics in the dairy industry (pp. 128–204); Utilization of antibiotics in the other food industry branches (pp. 205–236); and Use of antibiotics in feeding farm livestock (pp. 237–272). STI

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27. Content and Analysis of Mercury in Foods	□ £10.00	□ £6.50	□ £10.50
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35. Antibiotic Properties and Residues in Food excluding Nisin	□ £9.00	□ £5.00	□ £8.50
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37. Cadmium in Foods	□ £9.50	□ £5.50	□ £9.00
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50. Mycotoxins in Foods (Excluding Aflatoxins and Microbial Toxins)	• □ £8.00	□ £5.50	□ £9.00
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FAB 36

NISIN

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FOOD SCIENCE AND TECHNOLOGY ABSTRACTS

under the direction of:-

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INTRODUCTION

Food Annotated Bibliographies (FABs) are collections of abstracts on specific topics in food science and technology. The topics are chosen by the staff of the International Food Information Service as being of particular interest or importance. The topics normally interest individual workers, who may not require the full information provided in Food Science and Technology Abstracts, from which the abstracts for FABs are taken. The size and the cost of the FABs are controlled as much as possible with the interests of individual workers in mind.

Titles of the FABs now available are given on the back cover of this booklet. For up-to-date lists of FABs or suggestions for new topics please write to the address on the back cover. New subjects are searched for at least the five most recent volumes of Food Science and Technology Abstracts. Thereafter each FAB is updated monthly. Copies of each months abstracts on any topic may be obtained as indicated on the back cover of this publication. At the end of each volume of up-dating, the abstracts are merged and made available as a separate supplement to the original FAB.

Some of the larger FABs have been divided into sections to facilitate use. FAB 47 also has a subject and author index provided.

Copies of all original articles referred to in the abstracts may be bought (or occasionally borrowed) from the International Food Information Service. A form for ordering these is provided at the end of this FAB.

Coverage of the subject has been restricted to that of Food Science and Technology Abstracts, which covers over 1200 of the important food journals, patents from 20 countries and books published world-wide. Every effort is made to include all significant references, but editorial discretion is used on the many articles of borderline interest. If the reader particularly needs an exhaustive search of the subject, we will be pleased to provide any other references that we have available. We would, in any case, encourage readers to write or telephone us with any comments or queries that they may have.

H. BROOKES

EDITOR

1

Problems of residual antibiotics in milk.
Kaul, A.; Prasad, C.; Singh, R. S.
Indian Dairyman 33 (5) 329–334 (1981) [En] [Div. of Dairy Bact., Nat. Dairy Res. Inst., Karnal-132 001, India]

Entry of antibiotics into milk, effect of antibiotics residues on lactic acid bacteria, and methods of detection of antibiotics are the aspects covered in this article. CFTRI

2

[Use as food additives of antibiotics used in human or veterinary medicine.]
Lafontaine, A.
Medecine et Nutrition 17 (1) 37–38 (1981) [Fr, en] [Inst. d'Hygiene & d'Epidemiologie, 14 Rue Juliette Wystsman, 1050 Brussels, Belgium]

Objections to the use of medical or veterinary antibiotics as food additives are discussed, with reference to induction of resistance, cross-resistance to other antibiotics of the same class, and transfer of resistance to other species; necessary preconditions for authorization of use of antibiotics as food additives are also listed. AJDW

3

Further studies on the antibotulinal effectiveness of nisin in acidic media.
Somers, E. B.; Taylor, S. L.
Journal of Food Science 46 (6) 1972–1973 (1981) [En] [Dep. of Food Microbiol. & Toxicol., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

The antibotulinal effectiveness of nisin in tryptone-peptone-yeast-glucose (TPYG) broth was increased somewhat by lowering the pH to 5.5. The ability of nisin to inhibit the outgrowth of strain 56A spores was markedly increased at pH 5.5 by comparison to its effectiveness at higher pH values observed in previous studies. The increased effectiveness of nisin at pH 5.5 was less notable for the strain 69A, 113B, and 213B spores. The nisin sensitivity of the type E spores was essentially unchanged from that observed in earlier studies at higher pH values. At pH 6, nisin levels of 5000 IU/ml were insufficient to prevent spore outgrowth by *Clostridium botulinum* in cooked meat medium. Comparatively, much lower levels of nisin were effective in preventing botulinal outgrowth in TPYG broth at pH 6. The decreased effectiveness of nisin in cooked meat medium may be due to the binding of nisin to meat particles, and this binding is apparently not affected by lowering the pH to 6.0. IFT

4

Nisin controls bacteria in egg products.
Niewiarowicz, A.
Poultry International 19 (13) 64 (1981) [En] [Inst. of Anim. Products Tech., Poznan, Poland]

Studies were conducted on use of added nisin for enhancement of the efficacy of pasteurization of egg white and liquid whole egg. Samples of the egg products (i) without added *Staphylococcus pyogenes* or nisin, (ii) with addition of *Staph. pyogenes* at 2×10^6 cells/g but no nisin or (iii) as (ii) but with 0.02% nisin were used. Egg white was adjusted to pH 6.9 or 9.2, and pasteurized at 55° or 57°C; liquid whole egg (pH 7.6) was pasteurized at 56°, 58° or 60°C. A table of results is given for *Staph. pyogenes* counts in the pasteurized products. The results show added nisin to increase the efficacy of pasteurization in both egg white and liquid whole egg. In egg white, the effect of added nisin was greater at pH 6.9 than at pH 9.2. AJDW

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